THE
AMERICAN JOURNAL
OF
OBSTETRICS AND GYNECOLOGY

Editor,   GEORGE W. KOSMAK
Associate Editor, HUGO EHRENFEST

VOLUME V
JANUARY, 1923—JUNE, 1923

Original Communications

THE MICROSCOPIC AS COMPARED WITH THE CLINICAL DIAGNOSIS OF MALIGNANT UTERINE NEOPLASM

By Charles C. Norris, M.D., Philadelphia, Pa.

From the Laboratory of Gynecologic Pathology, University of Pennsylvania

MOST investigators recognize the value of making a routine histologic examination of all neoplastic tissue removed at operation. This study has been undertaken with a view to checking up with the actual figures the relative values of this procedure among the different types of malignant tumors.

TABLE I

CARCINOMA OF THE CERVIX

Total number of cases 253		
Squamous cell carcinoma 219		
Adenocarcinoma 34		
Early stage 41	(16%)	
Moderately advanced stage 103	(40%)	
Advanced stage 109	(43%)	
Clinical diagnosis positive 206	(81.4%)	
Clinical diagnosis carcinoma cervicitis? (doubtful diagnosis).. 29	(11.4%)	
Clinical diagnosis benign, but microscopic examination showed malignancy 6	(2.3%)	
Clinical diagnosis malignancy, but microscopic examination showed benign 3	(1.5%)	
Clinical diagnosis carcinoma of fundus, microscopic examination showed cervical origin 10	(3.9%)	
Clinical diagnosis sarcoma of the cervix, microscopic examination showed carcinoma 2	(0.7%)	

CARCINOMA OF THE CERVIX

Cancer of the cervix can generally be diagnosed correctly by clinical methods. In our series of 253 specimens, 81.4 per cent were diag-

---

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

nosed positively by the clinician, 11.4 per cent were suspected. In only 2.3 per cent was malignancy unsuspected by the clinicians.

In carcinoma of the cervix the lesion is not only fairly character-istic clinically, but is easily accessible to sight and touch, and can be examined thoroughly during the course of an ordinary office exam-ination. Furthermore, in doubtful cases, biopsy is a simple proced-ure. In considering the high percentage of correct clinical diagnoses it should be remembered that these cases were studied by specialists, and the proportion of correct clinical diagnoses is, therefore, probably considerably higher than it would have been if the same cases had been observed in general practice.

There are a few conditions, however, which so closely simulate car-cinoma that the correct diagnosis is almost impossible from clinical signs alone. I have seen two cases of tuberculosis of the cervix, in one of which the correct diagnosis was suspected, but in the other case carcinoma was diagnosed positively. Tuberculosis of the cervix generally produces a lesion that closely resembles carcinoma, and because of the rarity of the former condition, a diagnosis of carcinoma is usually made. In a series of 128 cases of tuberculosis of the cervix collected from the literature (Norris, C. C.: Gynecologic and Obstet-ric Tuberculosis, D. Appleton and Co., N. Y., 1921), over 88 per cent were diagnosed clinically as malignant. Syphilis may also produce a lesion that will strongly suggest carcinoma. Extensive laceration with eversions, particularly when complicated by pregnancy, is often suggestive of malignancy. Adenomyoma of the rectovaginal septum (Cullen) may produce a condition that closely simulates carcinoma, but that can easily be differentiated from the latter by microscopic examination.

The percentage of operability in cases reported of carcinoma of the cervix varies in different clinics. Graves' (Surgery, Gynecology, and Obstetrics, June, 1921) latest figures show an operability of 64 per cent. Of the 253 cases studied, but 16 per cent have been classed as in the early stages. Carcinoma of the cervix gives a relatively small proportion of five year cures, regardless of the method of treatment. The urgent necessity for early diagnosis is, therefore, apparent. Skeel (loc. cit.) states that the expectation of an increased number of cures of cancer of the cervix by surgical methods must be based upon ear-lier diagnosis, and that panhysterectomy should be reserved for cases in which a positive diagnosis can be made only with the microscope. This statement represents an extreme view, and if it had been ap-plied to the series herein reported, would have reduced the opera-bility to considerably less than 10 per cent. It is not usual, even today, for cases of inoperable carcinoma that have been treated locally for prolonged periods to be referred to surgeons. When the malig-

nant growths are deep seated, the most experienced surgeon may some-
times be in doubt. With the cervical lesions, however, biopsy is so
simple an operation and so certain a means of clearing up the doubt-
ful cases that to neglect its use is inexcusable.

CARCINOMA OF THE BODY OF THE UTERUS

In carcinoma of the fundus a different state of affairs exists. Here
we have a lesion that can be neither inspected nor palpated, and even
the experienced gynecologist is forced to depend more or less, for a
final diagnosis, upon the microscopic examination. The method sug-
gested by John G. Clark, which consists of cleansing the vagina and
cervix and then passing a sterile sound to the fundus of the uterus,
slightly manipulating the instrument in order to determine whether
or not bleeding occurs, and also to measure the depth of the uterus,
is of distinct value, and is a procedure that may be carried out in the
physician's office. Ewing has supplemented this test by taking smears
from the fundus, and by this means has been able to demonstrate in
a proportion of cases the presence of carcinoma cells or of fragments
of the tumor. Whereas these tests are of distinct practical value,
they are not conclusive in all cases, particularly in the early ones.
Even when the curet withdraws large quantities of brain-like tissue,
the diagnosis is not certain until a histologic examination has been
made. Such a case recently came under my care. The history and
clinical findings were those of carcinoma, and the diagnosis was fur-
ther strengthened by the macroscopic appearance of the curettings.
Histologic examination, however, showed the condition to be a hyper-
trophic polypoid lesion, and saved the patient the risks and discom-
forts of a hysterectomy. A cure was effected with radium, and the
patient has remained well to date. Such cases are, of course, the ex-
ception, but they nevertheless prove the value of routine histologic
examination.

There are many intrauterine lesions that may be confused with car-
cinoma. One of the most common of these is carcinoma combined
with myoma. An analysis of the cases studied shows that at least
75 per cent of the mistaken diagnoses were due to this condition. The
clinical symptoms of myoma may completely mask those of carcinoma,
and for this reason practically all gynecologists make it a rule to per-
form a curettage prior to employing radium in the treatment of these
tumors. Many instances could be cited in which the long-continued
menorrhagia of myomata has completely overshadowed the metror-
rhagic type of bleeding due to carcinoma. Of the 101 cases of carci-
noma of the fundus that were studied no fewer than 20 were clinically
diagnosed as benign, 57 were positively diagnosed by clinical means,
and an additional 24 were suspected of being malignant. Thus about
20 per cent were of the unsuspected variety. This in itself is suffi-

cient evidence to prove the necessity for making routine histologic examinations. Even after removal of the uterus cases will occasionally be encountered that will prove puzzling until they are subjected to microscopic examination. I have recently seen a specimen of a diffuse, partially submucous adenomyoma undergoing necrosis that left no doubt in my mind as to its malignancy until it was subjected to microscopic examination.

TABLE II

CARCINOMA OF THE BODY OF THE UTERUS

Total number of cases	101	percentage
Early stage	24	23.7
Moderate stage	53	52.4
Advanced stage	24	23.7
Clinical diagnosis positive	57	56.4
Clinical diagnosis doubtful	24	23.7
Clinical diagnosis benign, but proved to be malignant	20	19.8
Clinical diagnosis myoma	15	14.8
Clinical diagnosis metrorrhagia myopathica	2	1.9
Clinical diagnosis polypoid endometritis	2	1.9
Clinical diagnosis unsuspected	1	.9
Clinical diagnosis carcinoma of cervix but proved fundal in origin	1	.9

An analysis of the cases of carcinoma of the fundus that came to my notice, in which curettings were the only specimens submitted, shows the following results. Naturally these comprise the greatest proportion of doubtful cases, for if the diagnosis were positive, curettage would not be indicated. Of the entire series of 101 cases of carcinoma of the fundus, curettings alone were submitted to the laboratory in 58 cases. Of these, the clinical diagnosis was positive in 21 or 36.2 per cent. The clinical diagnosis was doubtful or suspected of malignancy in 22 cases, and in 15, or 25.8 per cent, it was benign. It is impossible to give the figures as regards the frequency with which the clinical diagnosis of malignant tumor was made but which proved to be benign. The latter, however, undoubtedly comprise a considerable group.

For making a successful diagnosis from curettings it is essential that the pathologist possess a thorough knowledge of the changes that take place in the normal endometrium during the menstrual cycle and at different ages, as well as the changes produced by pregnancy. He should, therefore be furnished such data from the history of each case as are necessary. A positive histologic diagnosis is often difficult to arrive at, and the cooperation of the clinician is essential in order to secure the best results. Recently a number of articles have appeared in the gynecologic literature decrying the operation of curettage as a routine procedure. This has no bearing on curettage performed for diagnostic purposes. With the latter end in view, the curettage should be a thorough one, as the carcinomatous lesion

may be small. Obviously it is impossible for the microscopist to make a correct diagnosis unless he receives the tissue. I prefer to have the tissue placed immediately in a bottle of Zenker's solution, and thoroughly shaken in order to avoid the formation of clots. Paraffin sections are the most satisfactory for this work. The paraffin in which the tissue is to be mounted should be hot, in order that the entire tissue may sink as nearly as possible to the same level. Ordinary paper boxes are not suitable for this work, a metal box being preferable. A good plan is to place the tissue in the mounting box, having the paraffin warm, and then to heat the box. This liquefies all the paraffin, and allows the tissue to sink to the bottom in a single layer. In this way all the tissue can easily be cut. Care must, of course, be exercised not to "cook" the tissue. Even with this method it is advisable to take a section, cut down into the block a short distance, take another section until all the tissue has been cut. In this way a portion of every particle of tissue is subjected to microscopic inspection. These suggestions are particularly applicable when there is only a small amount of curettings. The pathologist should be warned in every case in which there is the least suspicion of malignancy, in order that special precautions may be taken.

TABLE III

ADENOCARCINOMA OF THE BODY OF THE UTERUS (CURETTINGS).

Total number of cases	58	
Clinical diagnosis positive	21	(36.2%)
Clinical diagnosis doubtful	22	(37.9%)
Clinical diagnosis benign	15	(25.8%)

SARCOMA

The frequency of occurrence of this type of neoplasm has been greatly overestimated in the past, some pathologists asserting that 10 per cent of all myomata possess malignant characteristics. Sarcoma may originate in two ways: either as a primary malignant tumor, or as a degeneration of a primary benign neoplasm—generally a fibromyoma. In the latter type of tumor some form of degeneration is usually present, and in almost every specimen, if a sufficient number of blocks are examined, an area of markedly cellular appearance will be observed. These latter are without doubt, occasionally mistaken for sarcoma. Our series of sarcoma (including one endothelioma) consists of 35 cases. In contrast to this and removed during the same period of time, there were 1216 fibromyomata of the uterus. Of the 35 malignant connective tissue tumors, only 8 appear to have been degenerations of previously benign neoplasms, showing that in this series sarcomatous degeneration of myomata occurred in only about 0.6 of 1 per cent of cases. In confirmation of the correctness of the microscopic examination in the myomata and sarcomata it may be

stated that follow-ups have been made on both. None of the myomata have had recurrences and over 80 per cent of the sarcomata have succumbed.

The frequency of sarcoma in relation to myoma is of especial interest in view of the increasing use of radium and the x-ray in the treatment of certain forms of the latter. If sarcomatous degeneration were of frequent occurrence, operations would be indicated in practically all cases. Berreitter (Zentralbl. f. Gynäk, 1921, xlv, 1592) in his series of 716 cases of myomata found 6 malignant tumors, and Evans (Surg., Gynec. and Obst., 1920, xxx, 225) examined 4000 myomata from the Mayo Clinic and found 72 cases of sarcoma.

TABLE IV
SARCOMA OF THE UTERUS

		percentage
Total number	35	
Variety, spindle-celled	11	31.4
Variety, small round cell	7	20
Variety, large round cell	3	8.5
Variety, mixed cell	13	37.1
Endothelioma	1	2.8
Early stage	10	28
Moderately advanced stage	17	48.5
Advanced stage	8	22.8
Clinical diagnosis positive	8	22.8
Clinical diagnosis doubtful	5	14.6
Clinical diagnosis carcinoma but proved sarcoma	3	8.5
Benign but proved malignant	19	54.2
Clinical diagnosis myoma	16	45.7
Clinical diagnosis ovarian cyst	1	2.8
Clinical diagnosis endometritis	1	2.8
Clinical diagnosis pelvic inflammatory disease	1	2.8

1 case of sarcoma of the cervix, 1 case of sarcoma of the cervical stump.

CHORIOEPITHELIOMA

Various classifications of these tumors have been suggested. Chorioepitheliomata vary markedly as regards malignancy. Many efforts have been made to correlate the malignancy of the various types with their histologic appearance, but these have met with only limited success, perhaps due to the fact that there are so many intermediate types of cases. Some neoplasms, from their histologic appearance, are clearly extremely malignant, and about these no difference of opinion exists.

The diagnosis of chorioepithelioma from the curettings alone is often impossible. Some specimens are so clearly malignant that a positive histologic diagnosis is entirely justifiable, but, unfortunately, many cases do not fall within this category. This point is appreciated by all gynecologic pathologists, but is not, I believe fully recognized by clinicians at large. It is my belief that not a few uteri have been removed because of a mistaken histologic diagnosis of chorio-

epithelioma, when the condition in reality was merely one of retained secundines. Moreover I believe that these cases often go to swell the numbers of the less malignant type of chorioepithelioma. I have encountered only six cases of chorioepithelioma. Three of these were of the manifestly malignant type and were readily diagnosed from the curettings.

In the entire series of 391 cases of malignant tumors the clinical diagnosis was positive and correct in 272 cases (69.3 per cent); the true condition was suspected in an additional 59 cases (15 per cent); in 15 (3.8 per cent) the clinical diagnosis was of malignant tumor, but the type of neoplasm was not recognized, and in 45 (11.5 per cent) the condition was clinically regarded as benign and its true character determined only on histologic examination.

The laboratory should work in cooperation with the clinic and should be closely associated with the latter, for their mutual benefit. The laboratory should have the benefit of clinical evidence in all cases, and the follow-up of the clinic should serve as a check on the laboratory diagnosis. In conclusion let me say that the most experienced pathologists may hold different views about certain specimens. Even after a most thorough study a certain percentage of cases will be encountered in which it is impossible to give a positive opinion. It naturally follows that the more experienced the pathologist, the smaller this group will be. As regards the question of whether or not any given case is malignant, it is my opinion that if, after a thorough study and examination of a number of sections, some doubt as to the malignancy still exists, these cases usually prove to be benign. However, the safe plan for the pathologist to adopt is to state plainly that he is in doubt, and suggest that the patient be kept under observation, and that a second biopsy or curettage be performed immediately upon the recurrence of any suspicious symptom. In other words, histologic diagnosis has definite limits, and this fact should be appreciated by the clinician. It is extremely unsatisfactory, from the clinician's standpoint, to receive such a diagnosis, but one positive diagnosis that later proves to be incorrect is far more unfortunate. A doubtful histologic diagnosis compels the surgeon to exercise his clinical judgment, which is generally excellent, and is far more preferable than to have him accept a doubtful diagnosis as positive and act accordingly.

Chestnut and Twenty-second Streets.

THE TREATMENT OF CYSTOCELE, RECTOCELE AND UTERINE PROLAPSE*

By Robert T. Frank, M.D., F.A.C.S., Denver, Colo.

BECAUSE after vaginal plastic-repair, healing by primary intention is the rule and serious postoperative complications are infrequent, this intervention, like adenoidectomy, tonsillectomy, and curettage, is often performed by the general practitioner.

The indication for intervention is often based upon very doubtful foundation, much unnecessary operating being done. This is partly due to the fact that this region is given but scant notice in the standard text books of anatomy, and that proper anatomical material rarely finds its way into the dissection rooms, and even more so, to the fact that textbooks on gynecology concentrate their attention upon methods of denudation and suture rather than upon the proper selection of cases and the broad general principles involved in successfully narrowing the genital hiatus and retaining uterus, bladder and rectum in their normal relationship.

If properly approached, the essentials of the anatomy of the pelvic outlet can be demonstrated clearly and simply, and be learned and remembered without undue effort. This article aims to present the anatomy of the pelvis, the indications for intervention and the technic as based upon the anatomy, with the hope that it will prove of use to the profession and reduce both the number of operations performed unnecessarily and the large number of operative failures.[1]

ANATOMY

The pelvic outlet is closed in by a thin but strong musculofascial diaphragm, called the levator plate, composed of the two levatores ani and the two coccygeus muscles, which extend from the pubes to coccyx and sacrum (Fig. 1) and fuse in a median raphe.

Anteriorly, viewed from within, close to the inferior border of the symphysis, in the dissected subject, an elliptical gap is noted (known as the genital hiatus) (Fig 1). Through this opening the urethra and vagina pass downward. Behind the hiatus, and surrounded by fibers of the levator muscle, the rectum pierces the diaphragm.

The potential weak spot (the hiatus) is strengthened on its superficial aspect by a strong double membrane which closes up the subpubic angle by stretching from one descending ramus of the pubis to the opposite one (Fig. 2). This double fascia, containing between its
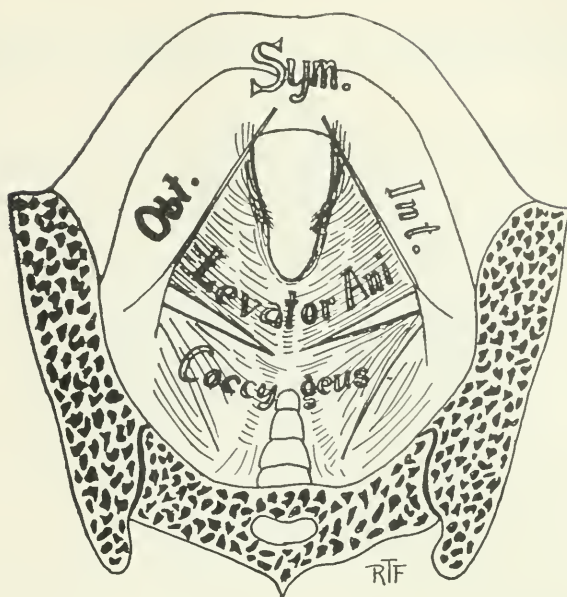
Fig. 1.—Pelvis, viewed from above. The levatores ani muscles and coccygei form the diaphragm. Behind the symphysis an elongated gap (genital hiatus) appears, through which the urethra and vagina pass. The puborectal fibers are shown projecting beyond the edges of the gap which appears unduly long as the rectum has been removed. The gap is reinforced below by the triangular ligament (see Fig. 2).
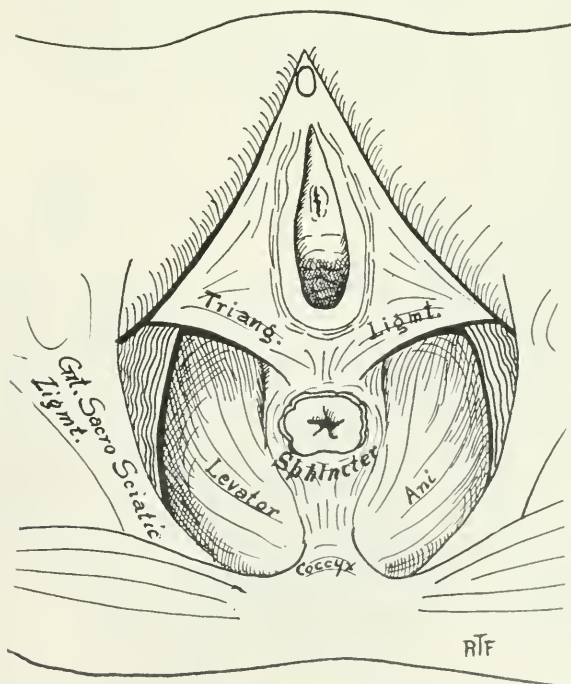

Fig. 2.—Pelvis of nullipara viewed from below. The skin, fat and superficial muscles have been cut away. The relations of the triangular ligament to the sphincter ani are well shown. The levator ani has been denuded of its outer (rectal) fascia.

superficial and deep layer the deep transverse perineus muscle (Fig. 3) is triangular in shape, and is therefore called the triangular ligament.

The genital hiatus is bordered on each side by fibers of the levator muscle, fibers which run from the posterior surface of the pubic bone to the rectum, and hence are known as puborectal fibers (Fig. 3). Along the free edge formed by the puborectal fibers two layers of fascia meet and fuse. The inner abdominal surface of the pelvic diaphragm (i.e., levator and coccygeus muscles) is clothed by a fascia called the levator fascia. The outer surface facing toward the ischiorectal fossa, is invested by a fascial layer named the rectal fascia (Fig. 9). Along the free margin of the genital hiatus, which corresponds to the edge of the puborectal fibers, the inner (levator) and outer (rectal) fascia meet and form a rounded edge (Fig. 6). To this edge the deep layer of the triangular ligament is applied, thus strengthening and closing a potential hernial site (Fig. 3).

The urethra and vagina penetrate both layers of the triangular ligament and during their passage through this structure receive fascial investments from it. The vagina also obtains some connection with the fascial edges of the genital hiatus which border its lateral walls.

Between the pelvic diaphragm below and the lowest portion of the peritoneal cavity above there is a considerable space. This subperitoneal space is shallower anterior and posterior to the uterus, where the uterovesical and uterorectal (or Douglas') culdesacs encroach upon it, but deep laterally where it forms the bases of the broad ligaments (Fig. 4).

The subperitoneal space harbors the blood vessels, nerves and lymphatics which supply the pelvic organs, and also the pelvic portion of the ureter.

The space is filled mainly by a network of strong bands of white and yellow elastic connective tissue of immense strength, which contains fat and unstriped muscle within its meshes. The strands appear to radiate from the supravaginal part of the cervix and are inserted into the fasciae lining the pelvic walls (obturator, levator). The vagina and rectum are surrounded by this connective tissue, which forms, respectively, the paracolpium and paraprocteum. The base of the bladder rests upon the thin layer running from the cervix to the posterior border of the pubic bones, pubocervical ligaments, or fascia (Fig. 5). Lateral to the uterus the connective tissues form the strong and massive parametria.

This subperitoneal connective tissue plays the major rôle in retaining the pelvic viscera in position. Its elastic structure allows a limited degree of motion. Excessive, and especially sudden strains, force the viscera downward upon the pelvic diaphragm which, though thin,
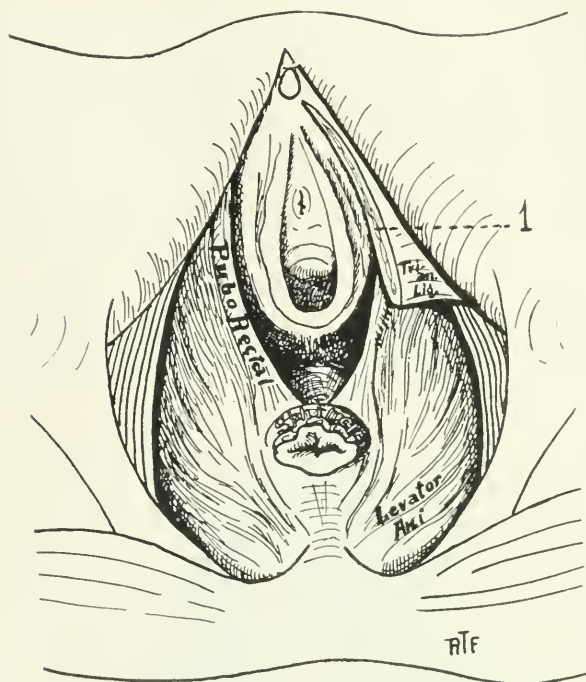
Fig. 3.—Pelvis of nullipara, viewed from below. The triangular ligament has been cut away except a small portion on the right. Vagina and rectum have been separated for a short distance. The puborectal fibers of the levator ani form the edge of the genital hiatus (or levator gap). Note the sphincter ani, superficial to the levator muscle.

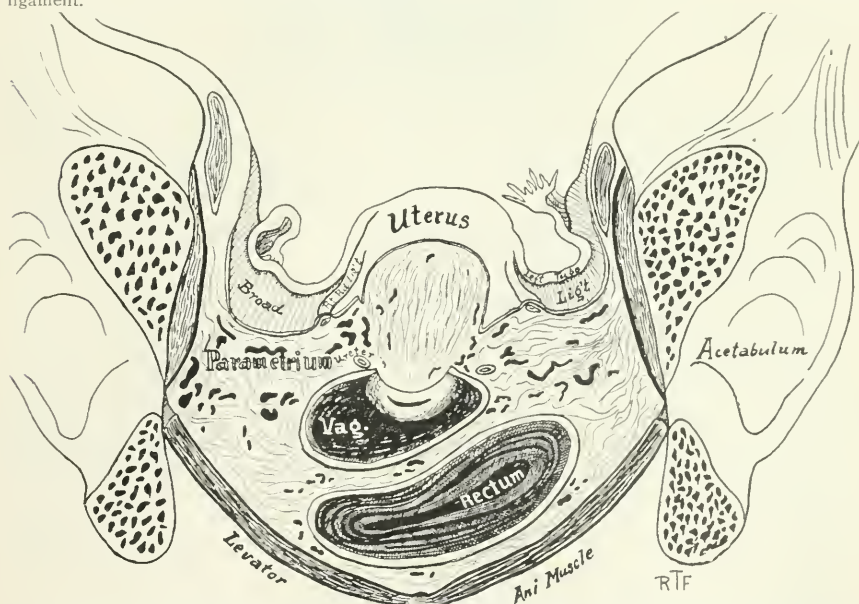*1*, Deep transverse perineus muscle appearing in cut section between layers of the triangular ligament.

Fig. 4.—Coronal section of a pelvis, passing through the anterior surface of the uterus. Note the massive connective tissue lying between the peritoneum and the levator muscle. The latter stretches across the pelvis. Above the parametrium proper, is the thin, transparent broad ligament.

is powerful. Contraction of the levator group then not only produces
an upward lift and shallowing of the bowl-shaped pelvic cavity, but
also a narrowing of the genital hiatus, all tending to give immediate,
powerful but transitory resistance to downward pressure.

The uterine ligaments, of which the round and sacrouterine liga-
ments are alone of importance in this connection, play an important
rôle only so far as they serve to tilt the uterus and thus subject
either the anterior or posterior surface of this organ to the forces
of intraabdominal pressure.

Short round and sacrouterine ligaments favor anteflexion; relaxa-
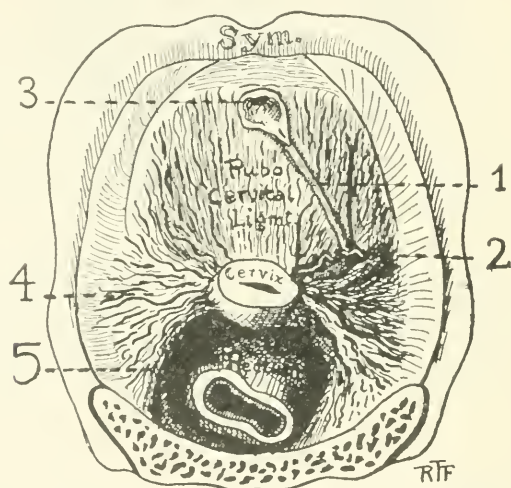tion encourages retroversion and retroflexion. The ligaments play

Fig. 5.—Pelvis viewed from above after removal of the peritoneum. The body of the
uterus, the bladder and left ureter have been removed. The wedge-shaped parametria, sacro-
uterine folds, and thin anterior bladder shelf (pubocervical ligament) are shown.
  1, Right ureter; *2*, uterine artery; *3*, urethra; *4*, parametrium; *5*, sacrouterine fold.

a most subsidiary rôle as far as fixation is concerned largely because
they lack tensile strength.

PATHOLOGY

Childbirth causes injuries to the muscular, fascial and connective
tissue structures of the pelvis. The triangular ligament may be
torn, one or both of the puborectal loops of muscles may be avulsed
from the pubic bones, the genital hiatus may be greatly dilated, the
pubocervical fascia may be split, etc., etc. It is not always possible
to define or recognize the tissues most injured. In general, however,
three main types of injury result and can be recognized and cor-
rected.

The evidence of these injuries appears either separately or com-
bined as cystocele, rectocele and prolapse of the uterus.

Cystocele is a descent of the bladder, projecting downward through

the anterior vaginal wall, and due to sagging, separation, or rupture of the pubocervical connective tissue. Rectocele may be high, appearing as a bulging of the posterior vaginal wall, and descending sometimes over an intact perineal body (Fig. 9B), or low, due to a tear of the fascia investing the rectum, plus a torn perineum. The high rectocele is due to a tear of the fascia of the rectum high up, at the bottom of Douglas' culdesac and resembles a sliding hernia (Fig. 9).

Prolapse or descent of the uterus shows itself in various degrees. The cervix may descend below the level of the ischial spines (first degree), reach the level of the vulva (second degree), or the entire uterus may protrude beyond the vulva (third degree or total prolapse).

The main lesions invariably consist in a tearing, or more often, stretching of the pelvic connective tissues, especially the lateral parametria. Such factors as retroversion or flexion, elongation of the cervix, or tears of the perineum, if present, are merely concomitant but not causative. They are, however, often due to the same etiology, namely, childbirth.

Cystocele, rectocele and prolapse of the uterus may be present coincidentally. Elongations of the cervix, cervical lacerations, retroflexion and other complicating troubles may, too, require correction.

INDICATIONS FOR TREATMENT

Not every case of cystocele, rectocele and prolapse requires operative intervention. Many patients should at least be tided over their period of child-bearing activity by palliative measures.[1]

A cystocele alone, if the perineum is intact, may be retained by a Skene or a Gehrung pessary. This is necessary if frequency of urination or incontinence develops.

A rectocele, alone, rarely causes more than annoyance. No pessary in the long run will adequately retain it.

Prolapse of the uterus, in a young woman, who desires to have more children, may be kept back with simple pessaries such as the saucer pessary of Schatz, or the hard rubber ring, globe or egg-shaped pessaries. These pessaries are removed at night by the patient and reinserted before rising. If cleanliness and care are exercised, they may be used continuously for many years.

It is also unwise to operate upon old, debilitated women who are poor operative risks. Here, too, the pessaries just mentioned are advised.

If operation is to be performed upon a woman who expects to have more children, the vaginal tube and outlet must not be unduly narrowed. Care must be exercised in repair of the cervix, trachelorrhaphy according to Emmet's method being preferable to cervical

amputation or tracheloplasty (by coring), because amputation frequently induces sterility, or if pregnancy supervenes, may cause severe dystocia. If the uterine body is displaced, most frequently either retroflexed or retroposed, the corrective operations should aim to shorten the round ligaments and not fasten the uterus to the abdominal wall, because ventrosuspension or ventrofixation may produce serious disturbances throughout pregnancy and during labor.

In women, who are to be sterilized at operation, or who have passed
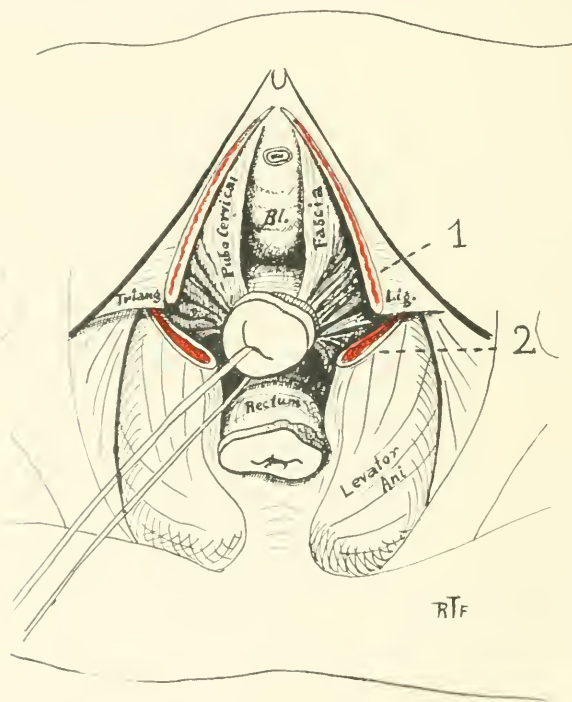
Fig. 6.—Pelvis of nullipara, view from below. The central portion of the triangular ligament has been removed and the upper portion of each levator muscle excised, in order to expose the cellular, connective tissues. By means of a suture through the cervix, the uterus is pulled down and to the left. The pubocervical fascia (or ligament) has been split sagitally to expose the bladder.

_1_, Appears to end on triangular ligament but points to the parametrium; _2_, edge of levator ani muscle cut across (in red) surrounded by its fasciae.

the menopause, none of the above objections apply. Here three methods of operation may be considered.

1. Repair of the anterior and posterior vaginal wall and perineum from below, followed by ventrofixation.

2. Interposition of the uterus between the inferior bladder wall and the vagina, and repair of the perineum.

3. Vaginal hysterectomy, with suture of the lateral stumps below the bladder, followed by perineal repair.

In very old women, or where severe recurrence of prolapse has taken place after vaginal hysterectomy, obliteration of the vagina may be practiced, if the patient and husband are first enlightened as to the end results of the operation.

With very few exceptions I have found the first method, repair of the cystocele and rectocele from below, combined with either the Alexander-Adams operation or ventrofixation from above, applicable to all varieties of prolapse.

Occasionally, in short fat women, where laparotomy is extra hazardous, and where a large cystocele causes the most serious disability,
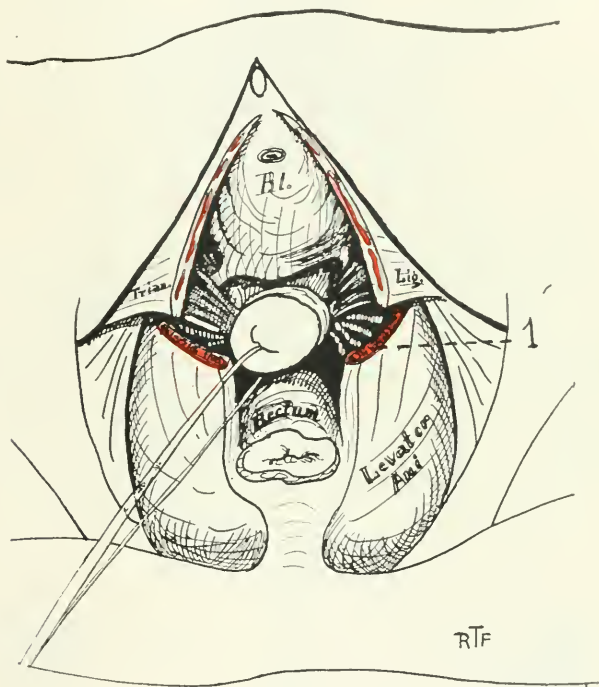

Fig. 7.—Further dissection of Fig. 6. The pubocervical fascia has been removed, exposing the bladder and showing the beginning of both ureters and their entrance into the parametria. *1*, Edge of levator ani muscle cut across.

I have used the interposition operation.[2] Even more rarely, in old women long past the menopause, who nevertheless possess a uterus of fair size, I have interposed the uterus, taking special care to fasten the uterine body to the pubocervical fascia and to the edges of the genital hiatus (Fig. 6).

I have never used the method of vaginal hysterectomy with utilization of the broad ligament stumps as described by Goffe,[3] and would reserve it for those rare cases of prolapse in which a vaginal hysterectomy is indicated for other reasons, as for example, in corporeal cancer. I have seen a number of cases in which this technic

was used, followed by huge recurrences of the cystocele. Such recurrent cystoceles may prove incurable, as the main central support of the pelvic connective tissues, from which the supporting fibers radiate, namely, the supravaginal part of the cervix, has been removed. This removal destroys most especially the pubocervical fascia or bladder shelf (Fig. 7).

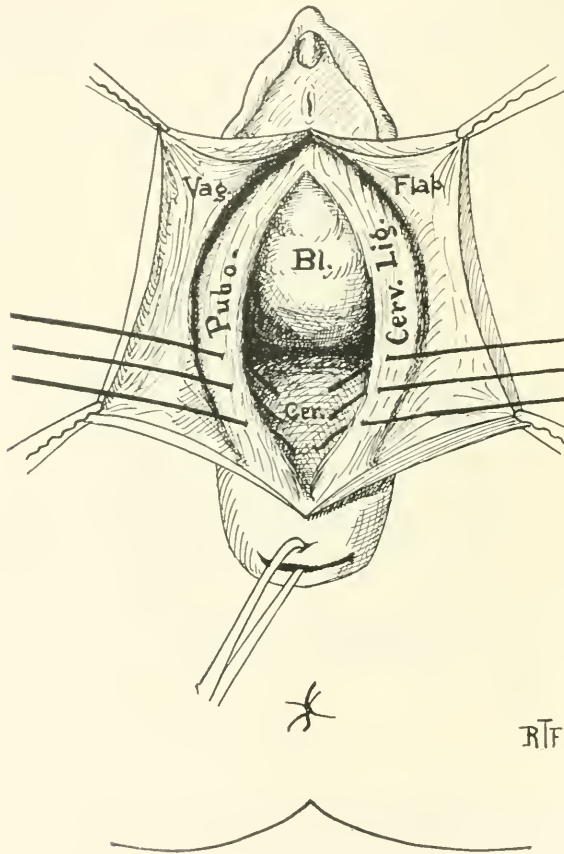Obliteration of the vagina (LeFort's operation) is indicated mainly

Fig. 8.—Operative exposure for the correction of cystocele. Vaginal flaps are retracted laterally. The pubocervical fascia (or ligament) is exposed and three sutures have been placed, which, when tied, shorten and raise the insertion of the fascia, thus elevating and retaining the bladder in a high position.

in the above cases and in very old and debilitated women, in whom a short intervention under local anesthesia is alone feasible.

The modern technic for repair of cystocele and rectocele by the methods to be described is the result of gradual evolution. The anatomical basis was given mainly by Hadra, Tandler, Halban and Martin, and others.[4] Unless the anatomy is fully understood, most uneven and unsatisfactory results will be obtained.

REPAIR OF CYSTOCELE

The principle involved is based upon separation of the descended bladder from the uterine cervix, repair of the pubocervical fascia in the median line, and suture of this structure high up to the cervico-uterine junction so as to reestablish a tense continuous bladder shelf.
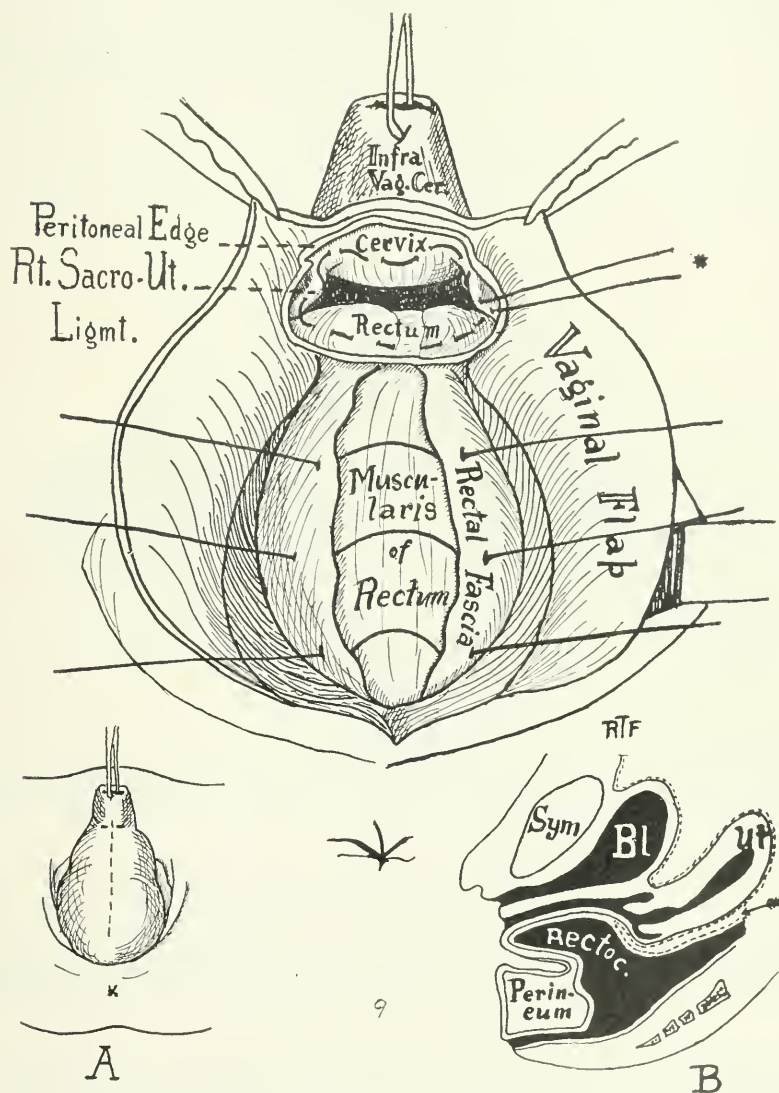

Fig. 9.—*A*, High rectocele exposed by traction on cervix. Dotted lines show location of vaginal incision.

B, Schematic median sagittal section showing relation of high cystocele to the culdesac, posterior vaginal wall and intact perineum.

C, Operative exposure of high rectocele. Vaginal flaps have been retracted, the torn rectal fascia exposed, and above, Douglas' culdesac has been opened. An asterisk marks the ends of the linen suture which obliterates the culdesac. Below are three sutures ready to be tied to close the rent in the rectal fascia.

The cervix is grasped with a volsellum and pulled down. A second forceps is placed ¼ inch below the external urinary meatus. The anterior vaginal wall is lightly incised between these two instruments. Two vaginal flaps are separated, care being taken to stay immediately beneath the vaginal mucosa. The tissue between bladder and cervix is now snipped in the median line and the bladder bluntly pushed off from the cervix *in the median line only*. If these directions are observed, strong fascial bands will be demonstrated running from the cervix upward and disappearing behind the posterior surface of the symphysis. These fibers are the pubocervical fascia (Fig. 6), continuous laterally with the parametria (Figs. 6 and 7). After defining this fascia, the bladder may be freely pushed off the cervix mesially and laterally. Before inserting chromic gut sutures through the fascia, cervix, and fascia on the other side, as shown in Fig. 8, careful hemostasis must be performed, as a retrofascial hematoma is usually fatal to success. The interrupted sutures are tied, thus retaining the bladder above the fascial shelf. Any part of the fascia not approximated is closed by additional sutures. The edges of
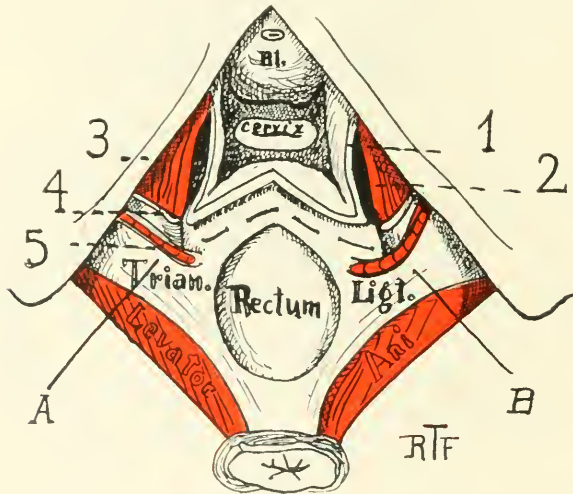

Fig. 10.—Dissection of a multiparous pelvis showing a low rectocele. Part of the vagina has been cut away, as well as the upper part of the stretched and torn triangular ligament and part of the rectal fascia. Note the structures traversed by the purse string suture *A B*.
1, Vaginal edge; *2*, levator edge; *3*, levator ani muscle; *4*, rectal fascia; *5*, edge of deep transverse perineus muscle cut across.

the vaginal flaps may be trimmed, to avoid redundancy, and the wound in the anterior vaginal wall closed by interrupted or continuous suture of chromic catgut or silk.

If curettage, trachelorrhaphy or amputation of the cervix are to be performed, these operations should precede the anterior repair.

REPAIR OF HIGH RECTOCELE

Exposure of the anterior rectal wall high up, opening of Douglas' culdesac, obliteration of this pouch by circular suture and repair of the torn rectal fascia. This repair is usually combined with repair of low rectocele and torn perineal body.

The posterior lip of the cervix is grasped and the uterus pulled upward and forward (Fig. 9-*A*). Immediately below the bulging portion of the rectum (cor-

responding in most instances to about 1½ to 2 inches within the vulva) a volsellum grasps the lateral posterior sulcus on each side. A median incision is made over the bulging rectum reaching to the top of the posterior fornix (Fig. 9-A). Two vaginal flaps are reflected, mainly by blunt dissection, and keeping close to the vaginal mucosa, until the edge of the torn and retracted rectal fascia is encountered on each side.

If now it appears as if the rectum were projecting downward from behind the cervix, in the fashion of a sliding hernia, the posterior culdesac is opened by a transverse incision through the peritoneum behind the cervix. Each peritoneal edge (anterior and posterior) is temporarily secured by a guide suture.
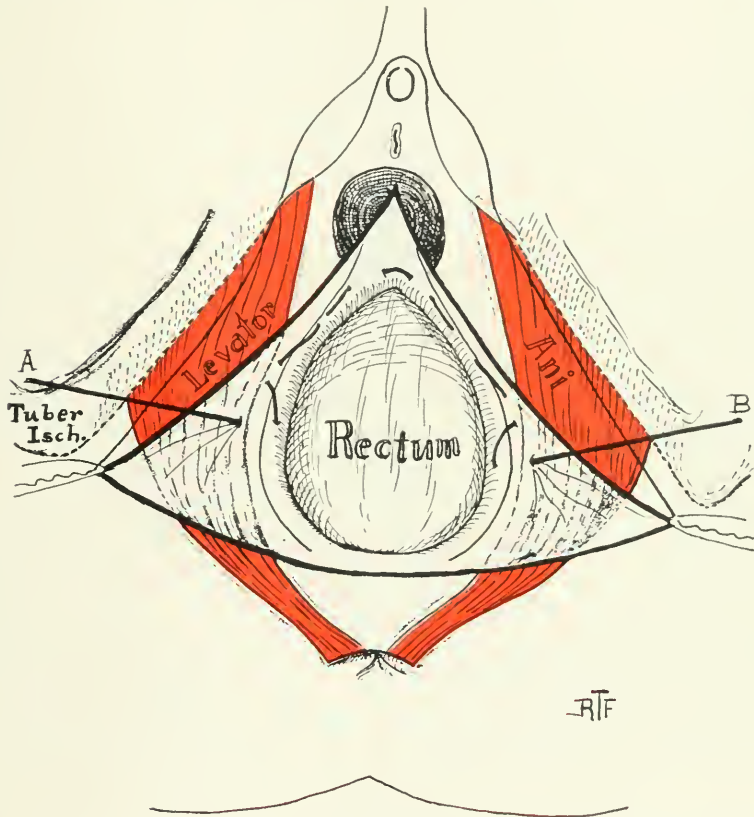

Fig. 11.—Operative exposure for correction of low rectocele. The triangular denudation is shown in line, the levator ani within this area is indicated uncolored, as if the tissues were transparent. Compare with Fig. 10 and note that the purse string suture *A B* traverses the triangular ligament, levator muscle with its fasciae (rectal and levator fasciae) and the fascia propria of the rectum on each side.

A purse string linen suture is now passed intraperitoneally, beginning on the patient's left side and taking in the left sacrouterine ligament as high up as can be reached, then passed through the peritoneal and muscular coats of the anterior rectal wall in at least three places, next taking the right sacrouterine ligament, and passing firmly in the cervicouterine junction (posterior cervical wall) and ending again in the left sacrouterine ligament (Fig. 9). This purse string is tied, thus obliterating the base of Douglas' culdesac, and, if properly placed, pulling the rectum upward. The peritoneal opening may be separately closed.

The rectal fascia which has been clearly defined by blunt dissection is approximated by a continuous suture of fine chromic catgut. The vaginal wall is trimmed and sutured with interrupted stitches to within an inch of the lower angle of the wound.

REPAIR OF LOW RECTOCELE AND LACERATED PERINEUM

Exposure of the anterior rectal wall, separation of the rectum laterally from adjacent structures, approximation of the levator edges and triangular ligament en masse.

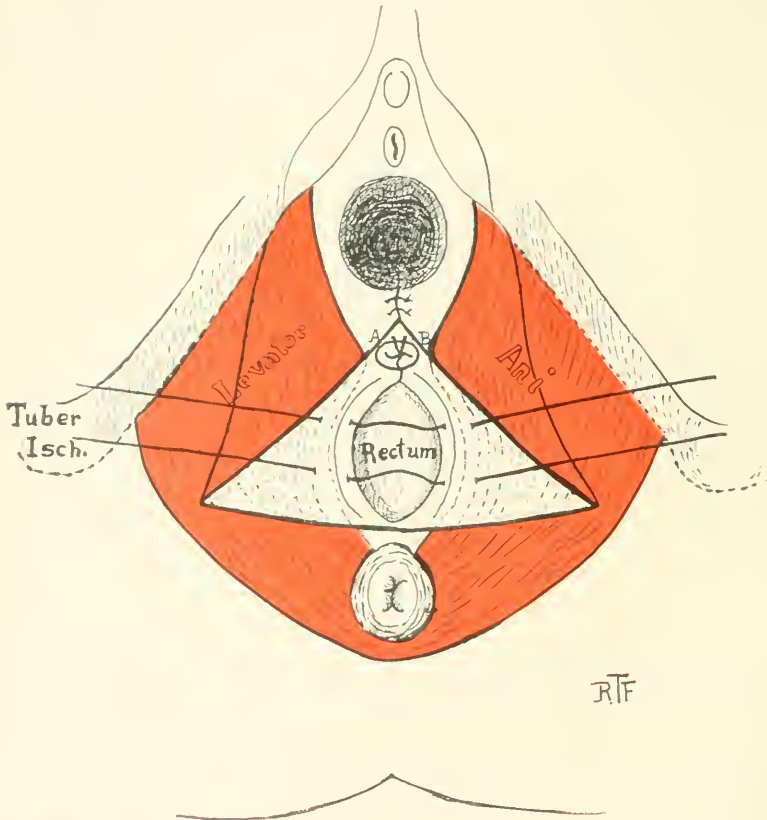The beginner will do well to seize the crest of the rectocele at a point which can

Fig. 12.—Fig. 11 after the purse string suture *A B* has been tied. The genital hiatus has been narrowed, the triangular ligament tensed, the anus elevated. Two sutures which traverse from side to side have been placed. When tied they will close the gap remaining.

be readily raised to the level of the external urethral meatus (Fig. 11). Laterally, points above the outlet of Bartholin's duct are grasped and a small triangle of vaginal mucosa denuded. A median incision gives less convenient access, but, if preferred, can be used.

The anterior rectal wall is thus exposed. Laterally toward the perineum, the gloved finger covered with gauze can bluntly push the rectum medianwards away from the tissues, taking pains not to penetrate into the deeper fascial layers. This blunt dissection, which occasionally tears large, friable hemorrhoidal veins requir-

ing no separate ligation, exposes on each side a triangular area containing the edge of the triangular ligament and, more deeply and laterally, the levator edge and its investing fasciae (Fig. 10).

Penetration of these deeper layers serves to expose the deep transverse perineus muscle (often mistaken for the levator ani) and the levator. The muscle fibers, deprived of their fascia, have little tensile strength, and the resulting perineum is scarry and tender. Hence I have long since abandoned suture of the exposed muscle fibers.

By gauging the mobility of the lateral structures, and visualizing the degree of approximation sought for the levator edges (see Fig. 12), the site for the purse-string suture to be placed can be determined. The beginner can seize the tissues tentatively with volsellum forceps and test the result by crossing these instruments.

A heavy chromic catgut suture is passed deeply on the patient's left (Fig. 11) grasping levator edge and triangular ligament, coming out close to the rectal wall. Light bites of the torn rectal fascia are taken until the crest is reached, the rectal fascia of the opposite side being gathered in turn. When a point opposite to the deep part of the suture has been attained, the tissues on the patient's right are penetrated in a reverse direction, see Fig. 11. A.

The tying of this purse string not only brings together the levator edges and triangular ligament but also raises the anus back to its proper position from which it has sagged (Fig. 12). The small remaining gap in the rectal fascia can be closed with interrupted chromic catgut sutures. The subcutaneous tissues and vaginal edges are then approximated. A subcuticular suture for the skin edge, reinforced by skin clips favors primary union.

If repair of a high rectocele preceded the low repair, the apex of the lower denudation begins approximately at the lower margin of the upper wound area.

SUMMARY

If the anatomy of the pelvic outlet is understood, if cases are judiciously selected, and if the technic described is followed, the results are fully as satisfactory as those obtained in the radical cure of inguinal hernia. A certain number of recurrences may be expected, especially in patients with flaccid tissues and general enteroptosis. It should be emphasized that patients, whose complaints and pains did not arise from the minor lacerations of the cervix, the small cystocele, the negligible rectocele present, will not be benefited by unnecessary plastic repair.

CONCLUSIONS

1. The bony pelvis is closed in by a bowl-shaped musculofascial diaphragm, the levator plate.

2. This diaphragm in its anterior portion has an elliptical gap, the genital hiatus, bordered laterally by the levator edges.

3. The genital hiatus is partially closed and the diaphragm is reinforced by the triangular ligament which extends from one pubic ramus to the other. The urethra and vagina pierce the triangular ligament.

4. The uterus, bladder and rectum are retained in their normal positions by strong, yet elastic, bands of connective tissue and un-

striped muscle, most important of which are the parametria, pubo-cervical fascia, paraprocteum and paracolpium.

5. The pelvic diaphragm takes up exceptional and especially short, excessive strains and stresses. Alone it is unable to support the pelvic viscera.

6. The round ligaments and sacrouterine ligaments possess little tensile strength and serve merely to tilt the uterus forward or back-ward.

7. Injuries, resulting almost exclusively from childbirth, produce defects in the pelvic tissues which cause cystocele, rectocele and pro-lapse.

8. Careful selection of cases requiring intervention must be made. Many patients with minor injuries require no operation. Patients still bearing children, may be, and the old and debilitated should be, treated palliatively.

9. During the age of childbearing, plastic vaginal repair must not narrow this canal to excess, and the uterus must be antiflexed by shortening of the round ligaments.

10. After the menopause, or after sterilization, ventrofixation may be used to aid in sustaining the uterus.

11. The repair of cystocele and of high and low rectocele closely resembles the operations in vogue for cure of abdominal hernias. The main reliance is placed upon the closure of tears in the fascial structures and narrowing of preexistent gaps (the genital hiatus).

12. Other technics (vaginal interposition, vaginal hysterectomy, obliteration of the vagina) should be reserved for very special and exceptional circumstances.

BIBLIOGRAPHY

(1) *Frank, R. T.:* A Study of the Anatomy, Pathology and Treatment of Uterine Prolapse, Rectocele and Cystocele, Surg., Gynec. and Obst., 1917, xxv, 42.

(2) In America, *Watkins* has fathered the interposition operation. (Am. Gynec. and Obst. Jour., 1899, xv, 420; Surg., Gynec. and Obst., 1917, xxv, 147.) In Europe, *Wertheim, E.* (Zentralbl. f. Gynäk., 1899, xx, 1009) and *Schauta* (Beitr. z. Geburtsh. u. Gynäk., 1903, xi, 68) were its main advocates. A fairly high mortality rate of 3.4 to 7.5 per cent and recurrences in 7 to 20 per cent speak against the routine use of this method (for statistics see *Döderlein and Krönig*), Operative Gynä-kologie, ed. 4, Thieme, Leipzig, 1921, p. 320-321).

(3) *Goffe, J. R.:* An Improved and Perfected Operation for the Relief of Ex-treme Cases of Procidentia, Cystocele and Rectocele, Am. Jour. Obst., 1910, lxii, 611.

(4) *Hadra, B. E.:* Remarks on Vaginal Prolapse, Rectocele and Cystocele. Am. Jour. Obst., 1889, xxii, 457. (This author recognized the importance of the pelvic connective tissues in prolapse and also advocated freeing the bladder for cystocele.)

Freund, H. W.: Über moderne Prolapsoperationen, Centralbl. f. Gynäk., 1901, xxv, No. 18, p. 441, also advocated liberation of the bladder and its retention by means of the paravaginal tissues.

Halban, J., and Tandler, J.: Anatomie und Aetiologie der Genitalprolapse beim Weibe, Braumüller, Wien 1907, ascribed the sole supportive properties to the mus-culature, especially the levator ani.

Martin, E.: Der Haftapparat der weiblichen Genitalien, Karger, Berlin, 1911 and 1912, placed prime importance on the connective tissues.

OBSERVATIONS ON THE BLOOD SUGAR DURING PREGNANCY AND THE PUERPERIUM

By Walter N. Rowley, M.D., Rochester, Minn.

From the Section on Obstetrics, Mayo Clinic

THE sugar concentrations of the venous and cord bloods were studied in a series of twenty pregnant women in order to compare the blood sugar concentration in the maternal blood at or near term with that thirty-six to forty-eight hours after delivery, at a time when the factors of shock or anesthesia can be excluded but when the uterus is still in the process of involution. The cord blood in every case was taken at the time of delivery.

The method of obtaining the specimen of blood from the mother was identical with that used routinely in the clinical laboratory for collecting blood chemistry specimens. The blood was taken about 8 A.M., the last meal having been served at 6 P.M. the day before and no breakfast allowed until the blood had been drawn. This allowed a fasting period sufficiently long to eliminate the influence of alimentation on the blood sugar concentration.

The median basilic vein was punctured and a turniquet applied to the arm. The blood was collected in sterile tubes containing enough potassium oxalate to prevent clotting. This specimen was analyzed by the modified Benedict method and by the same technicians who have charge of all the clinical blood chemistry. The patients were bled during the later months of pregnancy, usually at term or when they entered the hospital preceding labor, and again on the second morning after delivery, about thirty-six to forty-eight hours postpartum. The cord blood was obtained at delivery. As soon as the child had been delivered and properly cared for, the umbilical cord was clamped close to the abdomen and vulva, and the blood thus isolated from the cord was collected in a tube.

None of the patients in this series showed signs or symptoms of diabetes during antepartum care. Glycosuria was not present at any of the bi-weekly examinations of the urine.

The importance of blood sugar studies in pregnancy has been recognized. Schirokauer, Bergsma, Kampf, Benthin, Neubauer and Novak, Morriss, Slemons, Schiller, Killian and Sherwin, Guy, Caldwell, and others have contributed to the literature. Much of the work of foreigners was done by methods other than that of Benedict. Table I shows the comparative values noted by various observers.

Bergsma made numerous observations by the Frank-Moeckel plasma

method of sugar determination, and he asserts that it probably gives slightly lower values than the Benedict method. He found a maximal value of 0.136 per cent for the sugar concentration during the later months of pregnancy and a mean value of 0.09 per cent. The time of drawing the blood was not the same in all his cases. In the group of cases here reported, however, the patients were bled with uniform consistency both in time and method. Blood taken during the puerperal period gave the same value as during normal pregnancy. Blood from the cord had an average sugar concentration of 0.11 per cent. This, however, was influenced by anesthesia in some cases.

Morriss gives a chart of the comparative blood sugar values obtained by seven other observers who studied the blood sugar values during pregnancy. His own figures show a mean value of 0.10 per cent. The general average range of the normal may be considered as from 0.09 to 0.11 per cent. These percentages agree with findings in normal nonpregnant women. According to Morriss, the blood sugar content of cord blood was 0.12 per cent at birth and 0.13 per cent at the end of the second stage of labor. In nineteen of twenty cases, the maternal value at the end of labor was higher than the fetal value for blood sugar. Morriss' percentages show that the fetal blood is higher than the maternal blood during pregnancy. The factors in these calculations, however, were not consistent or constant and make the values less significant. Variations in the fetal blood were observed in cases in which an increase was noted in the maternal blood as a result of a long second stage labor, prolonged anesthesia, or operative delivery. In such cases Morriss found the mean value for the cord blood readings to be 0.17 per cent as compared to 0.13 per cent in the normal.

Schiller found values within the normal range for blood sugar concentration during pregnancy. Killian and Sherwin's average was 0.11 per cent. Caldwell and Lyle found a mean value of 0.09 per cent at the end of normal labor, an average somewhat lower than that of Morriss. The introduction of anesthesia always augmented the values as did operative procedures and protracted labors. McGuigan and Ross, and Steward and Rogoff have shown that anesthesia is a definite factor in the production of hyperglycemia.

Scott and Hastings studied the sugar concentration in the blood of dogs during exercise and found that the values fell steadily throughout the work period. In patients whose blood sugar values were taken at the end of labor the concentration was higher. This suggests that Morriss' percentages for the second stage may have been principally influenced by the chloroform used in anesthesia. However, he demonstrates a greater concentration in primipara than in multipara during

labor, probably owing to the amount of voluntary effort put forth during the second stage.

The blood sugar values on the infant have been thoroughly investigated by Sedgwick and Zeigler, and Guy. The former obtained an average of 0.08 per cent blood sugar in infants ranging from three to forty-three days of age. Guy notes a range of 0.06 to 0.11 per cent in normal infants, with an average of 0.07 per cent in forty-three cases. The fetal blood shows variations as a result of anesthesia, long labor, operative procedure, and asphyxia. Morriss' data show the influence of these factors on the fetal blood values which he found to rise when the maternal blood value rose.

The data which have been accumulated in my observations do not fall wholly in accord with the findings recorded in the literature. A series of fifty-three patients were observed during pregnancy, and a mean blood sugar value of 0.11 per cent was noted. The maximal value was 0.25 per cent in one instance; unfortunately, the postpartum reading was missed in this patient. No signs of diabetes were found, and labor was spontaneous and normal. The cord blood values determined on twenty-two specimens gave an average of 0.09 per cent. Thus, my data show an average maternal value of 0.11 per cent and a fetal value of 0.09 per cent; this definitely points to the fact that the maternal to fetal ratio is such that placental interchange of glucose can take place by a process of diffusion from the maternal to the fetal side. The mean average for the blood sugar concentration of normal pregnancy in this series approximates the upper limit of the general average which is 0.09 to 0.11 per cent. The fetal value of 0.09 per cent is slightly lower than the general average others have obtained, although this is the only group of readings influenced in any way by anesthesia, asphyxia, voluntary muscular exertion, or operative procedures.

Thirty-two blood sugar determinations were made on the cord blood. The highest reading, 0.15 per cent, was obtained in the case of a child (A230406) delivered by low forceps, the indications being fetal asphyxia. This would account for the hyperglycemia in this child even though ether, which was the anesthetic in all cases, was not taken into consideration.

The series of blood sugar determinations made postpartum was obtained on the morning of the second day after anesthesia, and so was not influenced by extraneous factors. Twenty-two cases were observed and a mean average of 0.14 per cent obtained; this is also higher than that obtained by other observers.

In twenty patients it was possible to obtain consecutive observations of the blood sugar during pregnancy, two days postpartum, and on the child from the cord blood. These patients have been divided

TABLE 1

Comparative Blood Sugar Values

	Normal Pregnancy	First Stage Labor	Second Stage Labor	Puerperium	Cord Blood, Normal Labor	Early Infancy	Operative Maternal	Labor Fetal	Anesthetic
Bergsma	0.109 (plasma)			0.09	0.11				Chloroform
Morriss	0.103	0.093	0.13	0.11	0.12		0.17	0.13	Chloroform
Sedgwick and Zeigler						0.08			
Schiller	0.10								
Caldwell and Lyle				0.09		0.09			
Killian and Sherwin	0.11								
Guy						0.07			
Rowley	0.11			0.14	0.09				Ether

TABLE 2

Blood Sugar Concentration Augmented During Puerperium

Group 1. Blood Sugar Concentration Augmented During Puerperium

CASE	AGE	PARITY	GAIN IN MOTHER'S WEIGHT, PER CENT	CHILD'S WEIGHT AT BIRTH		HEMORRHAGE POSTPARTUM	BLOOD SUGAR VALUE			CHARACTER OF LABOR
				POUNDS	OUNCES		BEFORE LABOR	AFTER LABOR	CORD BLOOD	
A333823	30	4		7	1	Slight	0.10	0.13	0.10	Forceps
A351603	32	1	22	7	11	Moderate	0.08	0.14	0.10	Forceps
A351287	20	1	25	6			0.12	0.17	0.08	Spontaneous
A75224	29	1	24	7			0.10	0.13	0.06	Forceps
A351390	27	3		8	8	Moderate	0.09	0.10	0.08	Spontaneous
A355413	25	2	23	6	3.5	Slight	0.10	0.15	0.09	Spontaneous
A355294	27	2		8	13	Slight	0.11	0.14	0.09	Forceps
A295053	32	3		7	6.5	None	0.09	0.16	0.09	Spontaneous
A142719	35	2	28	6	2.5	None	0.13	0.16	0.08	Spontaneous
A359824	24	1	18	6	11	None	0.09	0.09	0.06	Spontaneous
A155870	40	3		8	9	Slight	0.07	0.14		Spontaneous
A346300	23	3	20	5	8	Slight	0.12	0.15		Spontaneous
Average			23				0.10	0.14	0.08	

into Groups 1, 2, and 3, according to the respective blood sugar concentrations. In Group 1, are the patients whose blood sugar concentration was augmented during the puerperium; in Group 2, are the patients whose blood sugar concentration was decreased during the puerperium, and in Group 3, are the patients whose blood sugar concentration remained constant. Table II contains data on the cases in Group 1, including age, parity, percentage gain in weight, blood lost postpartum, character of labor, blood sugar values, and child's weight at birth. The average value for the blood sugar during pregnancy in patients in Group 1 was 0.10 per cent, very close to the average for all the cases during pregnancy, 0.11 per cent.

The blood sugar concentration for the postpartum period in Group 1 is 0.14, a difference of 0.04. Table II shows clearly this difference in every case and the average difference in concentration is striking. Throughout the whole series this ratio exists, though some cases are reversed with small differences and others show no change. The alteration of the blood sugar concentration with a resultant hyperglycemia in the postpartum period noted by observers on the same individual make the findings more significant. The mean average of the cord blood sugars is 0.08 per cent, or 0.02 per cent less than the average concentration during pregnancy. This corroborates the findings of Morriss whose mean difference, however, was based on the value obtained at the end of labor. The influence of ether on the cord blood values in my series is negligible. In one case (Case A335823), the fetal value equalled the maternal value during pregnancy, and in another case (Case A351603), in which labor was long and forceps necessary, it was slightly higher. The mean values undoubtedly show that the placental exchange is dependent on the higher concentration of glucose in the maternal blood. The cord blood values in patients in Group 1 did not show the patient's response to the effects of anesthesia or muscular effort in the same proportions as in Morriss' series.

Age, parity, and change in body weight do not influence the blood sugar concentration; reduction in blood volume due to postpartum hemorrhage is of no significance. Glycosuria was not present in any of the patients or related in any way to the determinations. The fetal weight had no bearing on the determinations from the cord blood. Long labors did not influence the readings of the maternal blood; such an influence would no doubt be transitory and readjustment would have taken place by the morning of the second day. This also applies to anesthesia.

One patient in Group 1 (Case A351287) had an enlarged thyroid and a basal metabolic rate of +13 in the last month of pregnancy. This may have been a factor in the high blood sugar concentration

in the postpartum stage. [This is suggested by a patient (Case A346385) noted in Group 3.]   In the first five patients in Group 1 delivered by low forceps, labor was exhausting. The postpartum blood sugar values in these cases, however, were not the maximum for the series. Three patients were delivered after thorough treatment for tertiary syphilis. This was not a factor in any way.

The cases in Group 1 show an average gain in weight of approximately 23 per cent during pregnancy; with one or two exceptions, the percentage increase was very close to this figure. There may be some significance in the loss of weight which occurs so rapidly on delivery of the child and secundines and continues by the elimination of fluids from the tissues, clinically noted by the large output of urine during the first day or two postpartum. This concentration of the body fluids may possibly increase the blood sugar values immediately postpartum.

In one patient studied since the compiling of Table II, repeated blood sugar determinations were made in the postpartum period. Glueosazone was found in the urine in the eighth month of pregnancy, and the blood sugar at that time was 0.08 per cent. On the second day postpartum, the reading was 0.10 per cent, on the fifth day 0.10 per cent, and on the seventh day 0.14 per cent. The concentration was consistently higher during the period of involution than during pregnancy.

Group 2 contains four cases in which the blood sugar concentration was decreased during the puerperium (Table III). The influences and factors of the specific case may account for the differences in concentration, though the general conditions are the same as in Group 1. In Case A230406 there is so little difference that the readings could almost be considered equal. In one case (Case A335129) the value for pregnancy, 0.17 per cent, is explained by nothing in the history or examination. The fetal blood value here is the result of a long labor and anesthesia, although the rise is slight when the length of anesthesia is considered. The high fetal value noted in Case A230406 is further proof of the influence of asphyxia on the blood concentration. The child was badly asphyxiated at birth and the blood sugar determination was made from blood taken from the cord immediately after delivery. The blood concentration in this group of patients is high throughout. Although the differences are the reverse of what they are in Group 1, they are very small.

Group 3 contains four cases in which the blood sugar values were the same during and after pregnancy (Table IV). The maternal sugar concentration was higher than the fetal value in every instance. Why the values were the same during and after pregnancy is not clear. In Case A346385 the thyroid was the controlling factor; the

TABLE III

GROUP 2. BLOOD SUGAR CONCENTRATION DECREASED DURING PUERPERIUM

CASE	AGE	PARITY	GAIN IN MOTHER'S WEIGHT, PER CENT	CHILD'S WEIGHT AT BIRTH		HEMORRHAGE POSTPARTUM	BLOOD SUGAR VALUE			CHARACTER OF LABOR
				POUNDS	OUNCES		BEFORE LABOR	AFTER LABOR	CORD BLOOD	
A348445	25	3		7			0.13	0.11	0.06	
A335129	27	1	18	7		Moderate	0.17	0.13	0.11	
A230406					13	Moderate	0.14	0.13	0.15	Spontaneous
A361293	25	1	22	6	12		0.11	0.09	0.05	Mid forceps

TABLE IV

GROUP 3. BLOOD SUGAR CONCENTRATION CONSTANT BEFORE AND AFTER LABOR

CASE	AGE	PARITY	GAIN IN MOTHER'S WEIGHT, PER CENT	CHILD'S WEIGHT AT BIRTH		HEMORRHAGE POSTPARTUM	BLOOD SUGAR VALUE			CHARACTER OF LABOR
				POUNDS	OUNCES		BEFORE LABOR	AFTER LABOR	CORD BLOOD	
A346385		6	10	5	12	Slight	0.17	0.17	0.05	Spontaneous
A351390	27	3		8	8	Moderate	0.09	0.09	0.08	Spontaneous
A365926	20	1	19	7	11	Slight	0.10	0.10	0.09	Spontaneous
A54202	26	1	35	7	8	Slight	0.14	0.14	0.11	Low forceps

gain in weight was only 10 per cent. The basal metabolic rate was
+35 at the sixth month of gestation and +16 at the seventh month.
The influence of hyperthyroidism on hyperglycemia is well estab-
lished, the increased activity of the thyroid early in the postpartum
period and its tendency to keep the blood sugar level high may ac-
count for the values obtained. In Case A351287 (Group 1) the in-
fluence of thyroid activity on the puerperal blood sugar value is
apparent.

When the total figures are computed for all of the cases in the
three groups and all other values obtained, the average maternal
value during pregnancy is 0.11 per cent and the average fetal value
0.09 per cent. The blood sugar value obtained during pregnancy
is less than that of the maternal blood postpartum and greater than
that of the cord blood. This consistency in the data is most striking.
Why this relationship exists in the majority of cases is not easily
explained. The factors influencing blood sugar observations in the
work of other investigators have been eliminated. Muscular exertion
during labor is not a factor in the production of postpartum hyper-
glycemia. Anesthesia is a contributing, but not a great, factor in
producing a rise in the cord blood values; asphyxia produces a more
marked rise than anesthesia. Placental interchange undoubtedly
depends on the difference in concentration in the maternal and fetal
bloods.

TABLE V

BLOOD SUGAR CONCENTRATION IN PATIENTS WITH MARKED NAUSEA AND VOMITING

CASE	BLOOD SUGAR	CASE	BLOOD SUGAR
A335823	0.10	A324486	0.11
A354072	0.10	A130639	0.14
A353467	0.12	A335129	0.17
A352102	0.10	A335823	0.10
A47612	0.14	A347329	0.17
A365260	0.12	Average	0.12

Whether or not involution of the uterus has a direct bearing on
this difference in blood sugar concentration is a matter of conjecture.
Involution, however, involves many factors and not only consists in
reduction of the size of the uterus and absorption and elimination of
the products of destruction, but also involves great vascular and
cellular changes in the whole body plus the establishment of a new
function, that of lactation. The findings in one case not included in
this series point against involution of the uterus as a factor influenc-
ing the blood sugar concentration. Determination of the blood sugar
before labor showed a concentration of 0.11 per cent. Labor was
not allowed to progress after onset and delivery was by cesarean
section followed by subtotal hysterectomy. On the third day post-
partum, the blood sugar concentration was 0.13 per cent and on the

sixth day 0.12 per cent. There is, however, a certain metabolic change early in the puerperium which influences the blood sugar concentration. Whether or not it is of the same origin as that which augments the glycemia of patients who vomit early in pregnancy has not been determined.

A series of eleven cases in which nausea or vomiting or both were prominent symptoms shows a consistently higher average for the blood sugar at this time than is noted during normal pregnancy (Table V). The blood sugar determinations were made on blood taken before the inauguration of any treatment other than that by fluids. The individual values are high in several instances and all are at or above the upper limit of the blood sugar fluctuation. The average for the eleven cases was 0.12 per cent. In one patient (Case A133697) who did not have nausea and vomiting but whose prominent symptom was anorexia of ten days' duration, the value obtained was 0.07 per cent. Dehydration was marked but this did not affect the concentration of sugar in the blood. The patient was very thin naturally and, having taken no food for ten days and but little water, she lost a great deal in weight. Concentration of body fluids, as a cause for the higher values obtained in patients with vomiting, seems to be ruled out by the case in which dehydration was the prominent feature. In this group, the toxic factor producing the condition seemed to influence the glycemia. Killian and Sherwin found an average blood sugar value of 0.13 per cent in patients with nephritic toxemia and 0.12 per cent in those with hepatic toxemia of pregnancy. Slemons found that normal values prevailed in preëclamptic toxemias, but convulsions caused a rise in the blood sugar. High arterial tension is given as a probable cause of hyperglycemia. This, however, was not a factor in cases of vomiting.

Hyperglycemia in the postpartum period is probably due to metabolic changes associated with the general process of involution; the endocrine system shares in this to an unknown degree. In early pregnancy, metabolism is so markedly changed that the reaction of the patient to the new metabolism may or may not produce toxemia. In cases in which toxic symptoms develop an increase in the blood sugar has been noted. Repetition of these observations with repeated basal metabolic readings and more frequent postpartum blood examinations would be of great value.

SUMMARY

1. The average range for blood sugar concentration in normal pregnant women is 0.09 per cent to 0.11 per cent which is the same as that found in nonpregnant women.

2. The average value in fifty-three observations of the blood sugar concentration during pregnancy was 0.11 per cent.

3. The average value in thirty-two observations of the sugar concentration of fetal blood taken from the umbilical cord immediately after delivery was 0.09 per cent.

4. The average value for twenty-two observations of the blood sugar concentration on the second day postpartum was 0.14 per cent.

5. Placental interchange of glucose is undoubtedly dependent on the higher concentration of blood sugar in the mother.

6. The influence of muscular exertion during labor is not a factor in postpartum hyperglycemia.

7. Anesthesia with ether is a contributing but not a determining factor in producing a rise in the sugar concentration of the cord blood.

8. Asphyxia produces a more marked rise than anesthesia with ether.

9. Involution of the uterus cannot be shown to be the primary factor in producing postpartum hyperglycemia.

10. The general physiologic change associated with involution may be a factor in producing postpartum hyperglycemia.

11. In certain types of toxemia there is an increase in the blood sugar concentration.

BIBLIOGRAPHY

(1) *Benthin, W.:* Ztschr. f. Geburtsh u. Gynäk., 1911, lxix, 198-212.   (2) *Bergsma, E.:* Ztschr. f. Geburtsh u. Gynäk., 1912, lxxii, 105-153.   (3) *Caldwell, W. E., and Lyle, W. G.:* AM. JOUR. OBST. AND GYNEC., 1921, ii, 17-34.   (4) *Frank, E.:* Ztschr. f. physiol. Chem., 1910-1911, lxx, 291-299.   (5) *Guy, R. A.:* Quart. Jour. Med., 1921, xv, 9-17.   (6) *Hirsch, E. F.:* Proc. Inst. Med., 1921, iii, 192.   (7) *Kampf:* Quoted by Morriss, W. H.   (8) *Killian, J. A., and Sherwin, C. P.:* AM. JOUR. OBST. AND GYNEC., 1921, ii, 6-16.   (9) *Kingsbury, F. B., and Sedgwick, J. P.:* Jour. Biol. Chem., 1917, xxxi, 261-268.   (10) *Langfeldt, E.:* Jour. Biol. Chem., 1921, xlvi, 381-390.   (11) *Lewis, R. C., and Benedict, S. R.:* Jour. Biol Chem., 1915, xx, 61-72.   (12) *McGuigan, H., and Ross, E. L.:* Am. Jour. Physiol., 1915-1916, xxxix, 480-490.   (13) *Morriss, W. H.:* Bull. Johns Hopkins Hosp., 1917, xxviii, 140-146.   (14) *Neubauer, E., and Novak, J.:* Deutsch. med. Wehnschr., 1911, xxvii, 2287-2289.   (15) *Schiller, H.:* Surg., Gynec. and Obst., 1919, xxix, 450-454.   (16) *Schirokauer, H.:* Berl. klin. Wchnschr., 1912, xlix, 500-503.   (17) *Scott, E. L. and Hastings, A. B.:* Proc. Soc. Exp. Biol. and Med., 1920, xvii, 120-122.   (18) *Sedgwick, J. P., and Ziegler, M. R.:* Am. Jour. Dis. Child., 1920, xix, 429-432.   (19) *Slemons, J. M.:* Analysis of the Blood in Eclampsia and Allied Intoxications. Am. Jour. Obst., 1918, lxxvii, 797-806.   (20) *Slemons, J. M., and Morriss, W. H.:* Bull. Johns Hopkins Hosp., 1916, xxvii, 343-350.   (21) *Stewart, G. N., and Rogoff, J. M.:* Am. Jour. Physiol., 1920-1921, li, 366-377.

SUGAR TEST IN PREGNANCY

By W. E. WELZ, M.D., F.A.C.S., AND A. E. VAN NEST, M.D.,

DETROIT, MICH.

From the Prenatal Clinic of the Department of Health, Detroit

FOR many years, some definite sign or aid in the early diagnosis of pregnancy (within first three months) has been sought. Abderhalden's use of ferments for digestion of placental protein for a diagnosis of pregnancy has not been of value to the desired degree; also the decrease in precipitation of the red blood corpuscles is not a specific criterion of pregnancy but is present wherever protein is being broken down.

It has long been noted that glycosuria in pregnancy is a frequent occurrence. In 1914 Franz Jäger,[1] working under Döderlein, used 100 gms. of levulose as a test for liver function in pregnancy, and found it present in the urine in 65 per cent of his cases, which was interpreted as a sign of insufficiency of the liver in pregnancy.

In December, 1920, Frank and Nothmann,[2] as a result of their investigations, reported that in thirty pregnant women alimentary glycosuria was produced in every case during the first three months of pregnancy, showing that renal glycosuria thus produced can be used as a means of early diagnosis of pregnancy, when other tests can furnish no definite diagnosis.

In September, 1921, Ludwig Nürnburger[3] also reported seventy-one cases in which it was shown that where there was a pregnancy of the first trimester, the sugar reaction was positive; and, in those cases where no pregnancy existed, a negative result was obtained.

If a normal person is fed 100 to 150 grams of grape sugar, the blood sugar increases normally 0.07 per cent to 0.14 per cent without the appearance of sugar in the urine. Frank has shown in normal persons that a hyperglycemia up to 0.19 per cent is not normally accompanied by the excretion of sugar by the kidneys, but with pregnant women an alimentary administration of even 100 grams of grape sugar leads to glycosuria with blood sugar under 0.19 per cent.

But here the blood sugar does not exceed the boundaries of physiologic hyperglycemia. On the basis of numerous researches, it may now be said that the spontaneous and artificial glycosuria of pregnancy occurs without an important increase of blood sugar content. Hence this renal glycosuria of early pregnancy may be used to diagnose pregnancy during the first trimester. Differentiation from other glycosurias, which are accompanied by hyperglycemia, such as diabetes mellitus,

primary liver disease, and the hypersecretions of internal glands, pituitary, thyroid, suprarenal, can be made by the low blood sugar percentage in pregnancy glycosuria.

This artificial renal glycosuria is present constantly in pregnancy only during the first three months, when other signs of pregnancy are inconclusive. After the twelfth week of pregnancy, it rapidly disappears, and can be evoked in the later months only in a definite percentage of cases (about 30 per cent).

We have used this method of diagnosis of early pregnancy in 71 cases. In the first 27 cases 100 grams of glucose were used. As this was not entirely satisfactory, a change to 150 grams was made. As the cases reported from Germany were from women accustomed to a low sugar intake, and as American women are accustomed to a high daily intake it was thought that a larger amount of sugar could be used with advantage in our cases. Folin and Berglund[4] have recently shown that 200 grams of glucose can be taken at one time without producing any glycuresis.

METHOD OF TEST

The patient on first being seen is told to come to the clinic the next morning without breakfast. The patient is then catheterized, the urine examined; and, if normal, the test is continued, and a specimen of blood taken for blood chemistry. Then we give 150 grams glucose dissolved in 500 c.c. of tea. The patient is required to keep the prone position for forty-five minutes. If the patient is allowed up and around, vomiting very often ensues during this period.

Forty-five minutes after sugar is taken, the bladder is catheterized, and the urine examined for sugar; again at one hour and one and one-half hours, the urine is taken and examined. Immediately after finding the sugar in the urine, a second blood specimen is taken for an estimation of blood sugar. This blood for second sugar estimation is usually taken between the one hour and one and one-half hour periods.

Of our first series of tests (27) using 100 gms. glucose, seven were at periods ranging from 14 to 24 weeks pregnant. As these were all advanced too far in pregnancy to diagnose by the sugar test, they may be ruled out entirely. Only one of these seven gave a positive result, that at 14 weeks; two had excessive hyperglycemia, 307-410 mg. per 100 c.c. of blood and were not considered as diagnostic of pregnancy. Of the other 18, which were under 12 weeks' period, fifteen agreed with the final diagnosis and three disagreed. In this series the urine was examined only at 45 minutes and 1 hour.

Our second series of cases using 150 grams of glucose and catheterizing at 45 minutes, one hour and one and one-half hours are as shown in Table I.

TABLE I

	DATE	SUGAR TEST	LAST MENSES	FINAL DIAGNOSIS	ESTIMATED PHYSICALLY TIME OF TEST	BLOOD SUGAR
1	1-17-22	Neg.	11- 1-21	Pregnant	17 Weeks	142.9 mg.
2	1-17-22	Pos.	11-10-21	Pregnant	10 Weeks	113.9
3	1-19-22	Pos.	11-17-21	Pregnant	8 Weeks	144.9
4	1-19-22	Neg.	11- 1-21	Not Pregnant		216.2
5	1-21-22	Pos.	11-15-21	Pregnant	9 Weeks	229.9
6	1-23-22	Pos.	11- ?-21	Pregnant	8 Weeks	125
7	1-23-22	Pos.	9-17-21	Pregnant	15 Weeks	171.6
8	1-28-22	Neg.	11-28-21	Not Pregnant		140
9	2- 2-22	Pos.	12-21-21	Pregnant	6 Weeks	254.8
10	2- 9-22	Pos.	12-10-21	Pregnant	8 Weeks	137.9
11	2- 9-22	Pos.	12- 8-21	Pregnant	9 Weeks	168
12	2-11-22	Neg.	12-23-21	Not Pregnant		150
13	2-16-22	Pos.	11-14-21	Pregnant	13 Weeks	183.5
14	2-16-22	Pos.	12- 8-21	Pregnant	9 Weeks	114.9
15	2-18-22	Neg.	2-16-22	Not Pregnant		190.1
16	3- 4-22	Pos.	1-14-22	Pregnant	7 Weeks	181.8
17	3- 4-22	Pos.	1-29-22	Pregnant	5 Weeks	209.4
18	3- 8-22	Pos.	12- 8-22	Pregnant	9 Weeks	213.9
19	3- 8-22	Pos.	11-30-21	Pregnant	15 Weeks	258.1
20	3-10-22	Pos.	1-31-22	Pregnant	5 Weeks	139.1
21	3-20-22	Neg.	12-15-22	Pregnant	15 Weeks	132
22	3-20-22	Pos.	12-20-22	Pregnant	13 Weeks	176.5
23	3-25-22	Neg.	12-20-22	Pregnant	14 Weeks	148
24	3-30-22	Pos.	3-12-22	Pregnant	10 Weeks	164.6
25	4- 6-22	Neg.	3- 1-22	Not Pregnant		135.8
26	4- 8-22	Neg.	1- 8-22	Pregnant	16 Weeks	88.5
27	4- 8-22	Neg.	1-10-22	Not Pregnant		141.9
28	4-13-22	Pos.	2- 3-22	Pregnant	12 Weeks	130.1
29	4-20-22	Neg.	4- 3-22	Not Pregnant		148.8
30	4-20-22	Neg.	11-28-22	Pregnant	16 Weeks	139.8
31	4-27-22	Neg.	2-25-22	Pregnant	8 Weeks	107.5
32	5- 6-22	Neg.	3- 6-22	Not Pregnant	8 Weeks	144.2
33	5- 6-22	Pos.	4- 6-22	Pregnant	12 Weeks	95.1
34	5-11-22	Neg.	3- 1-22	Pregnant	9 Weeks	148.8
35	5-11-22	Pos.	2-22-22	Pregnant	11 Weeks	151.2
36	5-13-22	Neg.	2-25-22	Pregnant	20 Weeks	161.8
37	5-18-22	Pos.	4-30-22	Pregnant	8 Weeks	186
38	5-18-22	Neg.	3-29-22	Not Pregnant	6 Weeks	131.8
39	5-25-22	Neg.	3- ?-22	Not Pregnant	6-8 Weeks	144.2
40	5-29-22	Pos.	3-25-22	Pregnant	8 Weeks	140.8
41	6- 1-22	Pos.	3-21-22	Pregnant	11-12 Weeks	156.3
42	6- 3-22	Neg.	4- 7-22	Not Pregnant		Spoiled
43	6- 8-22	Pos.	5-? -22	Pregnant	6 Weeks	85.1
44	6-10-22	Pos.	4- 2-22	Pregnant	12 Weeks	181.8

It will be seen from the above 44 cases only two cases (31 and 34) of those within the twelve weeks of pregnancy disagreed. These failed to give a positive sugar test, though later proved to be pregnant. In no case have we had a positive glycosuria, where there was no pregnancy, though having blood sugar estimations as high as 216.2 mg. per 100 c.c. of blood (Case 4). It will also be noted that Cases 4, 5, 17, 18 and 19, though agreeing with the final diagnosis, were of no value as there was a definite hyperglycæmia present, which could be due to any one of the before-mentioned diseases (diabetes mellitus, primary liver disease, internal gland disturbance), but after

careful examination we are of the opinion that these were all simple alimentary hyperglycemias.

Blood sugars were determined by the method of Folin, urine sugars by ordinary Benedict's and Fehling's solutions. The percentage of sugar in the urine was usually between 0.2 and 1.5 per cent. Though most of the positive cases will give a positive urine at 45 minutes, some will not show positive until the one hour or hour and a half sample of urine. Since adding the one hour and a half examination, we have found four which did not give a positive reaction until the last specimen was examined.

Nürnburger and his coworkers claim that in abortions of the first three months, the sugar reaction remains positive as long as the placenta remains attached, for the greatest part, to the uterine wall. We have not been able to follow our cases this far, as our work is in a prenatal clinic, but we have had three cases, in which there were signs of threatened abortion, with two positive and one negative results; all three aborted within ten days. Both Frank and Nothmann and Nürnburger found the sugar test positive in all their cases of extrauterine pregnancy also. We have not so far had occasion to test such a patient.

Whether this glycosuria of early pregnancy is the result of liver insufficiency as Döderlein has shown to exist in practically all cases, or whether there is a definitely increased permeability of the kidneys to glucose during this period, is probably still debatable. But from the recent work of Frank in Germany, who claims that 0.19 per cent blood sugar is the renal threshold for glucose in the normal person, and also the work in this country of Folin and Berglund, who have come to the conclusion that the usual renal threshold is between 0.16 per cent and 0.18 per cent, we are inclined to believe that there is a definite lowered threshold of kidneys for glucose during the first twelve weeks of pregnancy. On the other hand, Nürnburger assumed that the calcium ions exerted a colloid-fast effect on the kidney cells, and thereby accomplished a thickening of the kidney filter, but in spite of the administration of relatively large doses of calcium, he was not successful in influencing the renal glycosuria of pregnancy.

We believe that a spontaneous or artificially induced renal glycosuria, with a blood sugar estimation below 0.19 per cent in the first 12 weeks after conception, is a valuable aid in the early diagnosis of pregnancy. In our experience the test has proved correct in more than 95 per cent of our cases.

REFERENCES

(1) Ztschr. f. Geburtsh. u. Gynäk., lxxiv.   (2) München. med. Wchnschr., Dec. 10, 1920.   (3) Deutsch. med. Wchnschr., Sept. 22, 1921.   (4) Jour. Biol. Chem., li, No. 1.

THE PATHOLOGY OF UTERINE BLEEDING IN 100 ANALYZED CASES*

BY HERMAN GRAD, M.D., F.A.C.S., NEW YORK CITY, N. Y.

BLEEDING from the uterus, aside from that of menstruation, occurs together with a great number of pathologic lesions of the female pelvic organs. Occurring under these varied conditions of pelvic pathology, it is difficult to diagnose the cause of the bleeding in every case.

For the study of uterine bleeding the histories of 100 cases of this affection were taken from the records of the Woman's Hospital. These histories and pathologic findings were carefully studied and made the basis of this paper. The clinical investigation of the cases convinced me early in the study that uterine bleeding must be classified under six different groups, as in each group there is a definite etiological factor causing the bleeding. On the basis of these etiological factors the classification was made and the six groups of cases so classified are shown in Chart I.

Clinically every case of uterine bleeding can be classified under one of the above groups. It is obvious, however, that some cases of uterine bleeding may have one or more causative factors given in Chart I active at the same time. For example, a patient may suffer with an infection, may have a neoplasm in the uterus and be harassed with endocrine distress, or a pathologic gestation may be present coexistent with a neoplasm and infection. Under these complex pathologic conditions it would indeed be difficult to state the precise cause of the uterine bleeding. This is a very important fact to consider, and the study of these 100 cases of uterine bleeding brings out this fact very forcibly. The cases of uterine bleeding should be grouped according to what the clinician considers the most prominent symptoms in the case, and what he considers the most prominent, etiologic factor.

When a case of persistent uterine bleeding presents itself, before deciding on the therapeutic measures for relief, an endeavor should be made to place the case into one of the six groups enumerated above. By doing this the clinician will have made a very important step toward giving proper therapeutic measures for the relief and cure of the case in question.

The study of the 100 cases of uterine bleeding has brought to light

many interesting facts. I shall take up each group of cases by itself and point out the cause of the bleeding.

Pregnancy.—In the first group where gestation was the etiologic factor in the uterine bleeding, eight out of thirteen had retained secundines, the removal of which by curettage brought prompt relief.

Several interesting facts came to light by the study of this group, which I shall give here in detail, as I consider these facts of some importance.

In two cases, Nos. 7 and 36, an early abortion occurred five weeks before the cases came under observation. The patients complained of a

CHART No 1.
100 CASES OF UTERINE BLEEDING
Classified in 6 Groups

Group	Etiology	Pathology	Number of Cases
1	Pregnancy	Abortion. Uterine Mole. Hydatidiform Mole. Chorio-Epithelioma. Diseases of Placenta. Pathologic Implantation of Ovum. Ectopic Gestation. Malposition of Placenta.	13
2	Infection	Endometritis. Metritis. Salpingitis. Oophoritis.	23
3	Neoplasms of Uterus & Ovaries.	Polypoid Conditions of Uterus and Cervix. Fibroids. Carcinoma and Sarcoma Polyps. Ovarian Neoplasms.	38
4	Displacements Lacerations Congestion	Retroversion. Inversion of Uterus Subinvolution. Lacerations. Prolapsus Uteri.	13
5	Endocrine Distress	Hyper-function of Ovaries Hypo-thyroidism Disease of Hypophysis and Adrenals etc. Disturbed Balance of Function of Ductless Glands.	9
6	Constitutional Causes and Blood Discrasie	Cardio-Vascular Disease Nephritis. Phthisis Infectious Diseases, Rheumatoid Conditions Anaemia. Chlorosis. Pernicious Anaemia.	2
		Records incomplete	2
		Total	100

metrorrhagia of five weeks' standing. Pelvic examination was negative. Curettage brought away a very small piece of retained secundines in both cases and the rest of the curettings showed as the pathologist expressed it, "typical premenstrual mucosa." These cases bring out the fact that after abortion, the uterine mucosa regenerates promptly preparatory for the normal menstrual cycle of the coming month, in spite of the fact that the uterine cavity harbored a small portion of retained secundi.

No. 29 was also an interesting case in this group. The patient was forty-three years old and had three children. Examination showed a fibroid of the uterus, a cervical polyp and there was a history of an abortion. On account of the abortion the case was placed in the first group instead of the third, under neoplasm. A curettage resulted in a cure of the uterine bleeding of five weeks' standing. The pathologist made the following report: "decidua compacta and spongiosa, adenoma

polyposum of the cervix. Polyp shows large cervical glands of the hyperplastic type.'' The cause of the uterine bleeding was retained secundines, the polyp and fibroid having nothing to do with the bleeding.

In this group of uterine bleeding there were three cases due to ectopic gestation, Nos. 4, 9, and 58. The pathologist shows two inter-

Uterine Bleeding
CHART No II

PREGNANCY, 13 CASES
Pathologic Report

No	Endometrium	Uterine Glands	Uterine Tubes	Ovaries	Duration of Uterine Blood	Age	No. of Pregnancies	Operation
4	Not stated	Not stated	Ectopic	Normal	4 Wks	27	2	D&C. Trachelorrhaphy Left Salpingectomy Ectopic Vent. Susp. App.
7	Premenstrual History of Abortion	Premenstr'l	Normal	,,	2 Months	25	1	Divulsion & Curettage
9	Not stated	Not stated	Ectopic in stump of Tube	,,	1 Year	31	None	Removal of stump of tubes previously resected
19	Placental tissue	,,	Normal	,,	1 Month	29	3	Spontaneous expulsion of Foetus & Placenta
23	Low impl't'd Placenta	,,	,,	,,	3 ,,	20	1	No Operation Pregnancy
25	Retained secundinae		,,	,,	1 ,,	30	3	Divulsion & Curettage
29	Dec. comp.& Spong. oedm polyp	Hyperplastic glands of Cervix	,,	,,	1 ,,	43	3	Removal of polyp. Divulsion & Curettage
36	Premenstrual History of Abortion	Premenstrual	,,	,,	6 Wks	32	4	Divulsion & Curettage
40	Chorio-Epithelioma	Not stated	,,	,,	,,	27	None	Pan-Hystero bil. salpingo-oophorectomy
42	Retained secundi.		,,	,,	3 Months	29	?	Divulsion & Curettage
50	Normal	Normal	,,	,,	6 Wks	39	7	Spontan's expulsion of Foetus & Placenta
58	Round cell Infiltration	Distorted Glands	Ectopic	,,	2 Months	29	2	D&C Repair of Ant. Vag. Wall. Bil.Salpingectomy
100	Early Placenta	Not stated	Normal	,,	6 Wks	29	4	D&C Trachelorrhaphy

Summary of Causes of Uterine Bleeding in 13 Cases
4 Causes

	CASES	
1	8	Abortion Nos 7-19-25-29-36-42-50-100
2	3	Ectopic Gestation 4-9-58
3	1	Low Implanted Placenta 23
4	1	Chorio-epithelioma 40

esting facts in the specimens. In Case No. 9, the gestation occurred in the remnant of the fallopian tube, that had been resected at a previous operation. Ectopic gestation in stumps of resected tubes has been observed repeatedly. It seems to me therefore, in the light of these repeated observations, that resection of the uterine tubes is a very questionable procedure. It is a question whether a resected tube is ever a functionating organ. A resected tube appears to be more of a menace

to the individual than a benefit. In this case the patient was thirty-one years old. She had one child. She was laparotomized for chronic salpingitis and had the right tube resected. Four years later an ectopic gestation occurred in the resected tube. An interesting question arises, in the light of these observations, how does the fecundated ovum reach the remnant of a resected fallopian tube? I have, as others have, repeatedly observed in reopened abdomens, that the resected tube was firmly adherent to the broad ligament and no osteum existed. Therefore, if such are the facts, a fecundated ovum can only reach this remnant of the tube by way of its open uterine end, by migration through the opposite tube. The pathologist says: "section of the tube stump shows early pregnancy, with double layer of epithelioma on surface." This shows conclusively that the tube was adherent, and one would hardly expect to find an open distal end of a tube so adherent.

In the second case, No. 58, the patient was twenty-nine years old and had two children. She had a metrorrhagia of two month's duration. She had the following operations: divulsion and curettage, repair of anterior wall, bilateral salpingectomy, ectopic on right side. The pathologist makes the following report: "Chronic endometritis. Tubal gestation. Tube contains blood clots. Section of tube shows fairly well preserved chorionic villi. Section of curettings shows remnants of mucosa with numerous round cells in the stroma and a few distorted glands."

This case of ectopic gestation is here reported because a bilateral salpingectomy was done. This brings up an important question, namely, under what conditions should the opposite fallopian tube be removed in operating for ectopic gestation? It is in the experience of every gynecologist that in ectopic gestation the fallopian tube opposite to the gravid one, looks congested, thickened and engorged. It is very difficult to say if the tube is diseased or normal. It is very frequently a difficult problem to decide, while the abdomen is open, what it is best to do. Is there anything that can guide one in deciding what best to do to avoid the mistake of removing a normal tube or leaving behind a diseased one?

On two very important occasions this question confronted me. The tube opposite to the ectopic looked diseased, with a gonorrheal history, behind the ectopic. I decided against a salpingectomy and I am glad to say that in one of these cases, since the operation, two children were born, while in the second case no symptoms of pyosalpinx developed so far although no pregnancy has occurred. In both of these cases the removal of the tubes was seriously contemplated at the time of operation and I refrained from doing so only on account of the youth of the patients. I should advise against salpingectomy of the opposite tube in ectopic gestation in the light of my own experience, and should

remove the opposite tube only in those cases where the tube is so hope-lessly diseased that it is beyond the possibility of natural repair.

What is the cause of the uterine bleeding in this group of cases? In the abortion cases the uterine bleeding is readily understood. Tissue changes and cell destruction result in the escape of blood and hence the uterine bleeding. In the early months of pregnancy before the placenta forms, faulty implantation results in tissue destruction and a necessary escape of blood. After the placenta has formed bleeding may occur from disease of the placenta or faulty position, or the placenta may undergo changes like in the chorioepithelioma. In tubal gestation the bleeding may occur from two sources. First from the gestation sac itself as a result of faulty implantation, the blood reach-ing the uterine cavity by way of the patent uterine end of the tube, or secondly the uterine bleeding may have its source from the endometrium, a proliferation having taken place in the endometrium as a result of the tubal gestation.

Infection.—In the second group of cases where infection was the etiologic factor there were 23 cases. A noteworthy feature in this group is the fact, that in every specimen subjected to pathologic examination the endometrium showed pathologic changes. Chart III shows these pathologic changes in detail in the 23 cases belonging to this group. In four cases out of 23 a polypoid condition of the endometrium was encountered. In 11 cases out of 23 chronic endometritis was found. In two cases the endometrium was found edematous, thick and pale. In one case the pathologist reports that the endometrium showed various phases of menstruation. The fallopian tubes had round-cell infiltration in four cases. Hydrosalpinx was present in two cases, pyosalpinx three times and in 11 cases the tubes were found normal. The ovaries showed cystic degeneration in four cases. In 18 cases the ovaries were normal. In one case the ovaries were carcinomatous.

From this summary it is very obvious that in cases with menstrual disturbance and uterine bleeding where infection is the etiology, 20 per cent show a polypoid condition of the endometrium; 55 per cent an inflammatory condition of the endometrium with round-cell infiltra-tion and the remaining 25 per cent have various other pathologic dis-turbances. Endometrial pathology is evidently the most frequent cause of uterine bleeding in infection of the female generative organs. The onslaught of the infection is borne by the endometrium which has to bear the brunt of the attack of the microorganisms, and although the uterine glands and endometrium undergo a physiologic regen-eration from month to month, the endometrium cannot entirely throw off the invasion of the microorganisms and get rid of the inflamma-tory exudate, which is present in the form of a round-cell infiltration in over 55 per cent of cases.

Uterine Bleeding
CHART No III-a
INFECTION 23 CASES
Pathologic Report

No	Endometrium	Uterine Glands	Uterine Tubes	Ovaries	Duration of Uterine Bleeding	Age	No of Pregn's	Operation
3	Endometritis, Thick polypoid growth, oedematous	Interval type	Normal	Normal	4 Months	39	2	Pan-Hysterectomy Bil Salpingo-oophorectomy
6	Adenoma polyposum	Hyperplastic	Rd cell infiltration	Carcinoma	2 Years	50	3	Pan Hysterectomy Bil Salpingo-oophorectomy
12	Myoma polyposum	Premenstrual	Hydrosalpinx	Normal	3 Months	45	0	Supr vag Hysterect Bil Salpingo-oophorect
15	Round cell infiltration	Interval type	Inflammation Rd cell infiltration	Fol cysts	2 Years	21	0	Supr vag Hysterect Bil Salpingo-oophorect
18	Various phases of menstruation	Various phases of menstruation	Pyosalpinx	Fol cysts	2 Weeks	46	1	Hysterectomy Bil salp.-oophorect
27	Oedematous thick and pale	No change	Granulation tissue	Normal	3 Years	44	1	Hysterectomy
30	Ch Hemorrhagic Endometritis	Premenstrual changes	Normal	"	7 "	32	3	Pan hysterectomy Left salpingo-oophorectomy
31	Oedema	Hyperplasia	"	"	6 Months	39	2	Pan hysterectomy Bil Salp-oophorect
33	Thickened Polyp Rd cell infiltration hyaline degeneration	"	"	"	2 Years	46	7	Pan-hysterect Bil.salp.-oophorect
39	Ch Endometritis Rd cell infiltration	"	"	"	1 Month	26	1	D&C cured
45	Ch Endometritis	Hyperplastic Rd cell infiltrate	"	"	6 Weeks	30	0	D&C
47	Ch Endometritis	"	"	"	5 "	21	1	D&C Pessary
48	Round cell infiltration Hyperplastic	Hyperplastic	"	"	1 Year	41	3	D&C Good result
51	Not observed	Not observed	Thickened Rd cell infiltratn	"	6 Months	31	3	Bil salpingectomy Good result
53	Ch Endometritis Rd cell infiltration hyaline degeneration of vessel wall	"	Normal	"	6 "	32	2	Vag. hysterect Left salp-oophorect
54	Not observed	"	Diseased Ch pen salpingitis	"	4 "	28	0	Left salpingectomy Short g round lig Appendix
61	Not observed	"	Sub-acute Salp. Rd cell infiltration	"	5 Years	23	0	Bil salpingectomy
65	Not stated	Not stated	Buried in adhesions	Buried in adhesions	11 "	30	2	Freeing of adhesions of adnexae Removal of cyst Myocard of Morgagn.
76	Ch Endometritis Round cell infiltration	"	Normal	Normal	6 Months	28	0	D&C & Radium
83	Hyaline degeneration	Hyperplastic	Hydrosalpinx	Fol cysts	Many years	49	4	Hysterectomy Bil Salp-oophorect
86	Ch Endometritis Rd cell infiltration	o	Pyosalpinx	"	3 Weeks	19	0	Hysterectomy Bil salp.-oophorect
90	Ch Endometritis Rd cell infiltration Oedematous	Distorted Hyperplastic	Normal	Normal	4 "	21	1	D&C Good result no bleeding
99	Not observed	Not observed	Pyosalpinx	Hemorr Corpus luteum	6 "	29	4	Bil salpingectomy Rt.oophorectomy Myomectomy

CHART No III-b
Summary of Causes of Uterine Bleeding in Cases of Infection
2 Causes

1	55%	11	Endometritis Nos 15-30-39-45-47-48-53-76-83-86-90
2	19%	4	Polypoid Condition of Endometrium Nos 3-6-12-33
		1	Various Phases of Menstruation No 18
		2	Oedema of Endometrium Nos 27-31
		5	Not observed Nos 51-54-61-65-99
		23	

Uterine Tubes

45%	11	Normal Nos 3-30-31-33-39-45-47-48-53-76-90
	2	Hydro-salpinx Nos 12-83
	3	Pyo-salpinx Nos 18-86-99
	4	Round Cell Infiltration Nos 6-15-51-61
	3	Chronic Salpingitis Nos 54-65-27
	23	

Ovaries

80%	18	Normal Nos 3-12-27-30-31-33-39-45-47-48-51-53-54-61-65-76-86-90
	4	Cystic Nos 15-18-83-90
	1	Carcinoma No 6
	23	

That this is a correct interpretation of the pathologic findings in these cases is further borne out by the study of the cases tabulated in Chart III. In 45 per cent of the cases of uterine bleeding the uterine

tubes were found normal and the ovaries were normal in 80 per cent of the cases. In Case No. 3, the patient 39 years old, who had two children, was suffering with a metrorrhagia of four months' duration. A panhysterectomy and a double salpingooophorectomy was done. When the specimen was examined both tubes and both ovaries were found normal. The endometrium was found diseased and presented a thick polypoid growth, which was edematous and had thrombosed vessels. In this case the metrorrhagia was due to the polypoid growth in the endometrium, supplemented or perhaps aggravated by the endometritis. Again in Case 30, a woman 32 years old, with a history of metrorrhagia off and on for seven years, was operated on, and the specimen showed normal tubes and ovaries, with a diseased endometrium to account for the repeated attacks of metrorrhagia of many years' standing.

Taking these facts into consideration one is justified in concluding that uterine bleeding in cases of infection is due to pathologic changes in the endometrium in the form of an infection, and that a certain number of cases of uterine bleeding are due to a polypoid condition of the endometrium, which occurs in at least 20 per cent of cases. This brings up an important question, namely, that of curettage for metrorrhagia in cases with a history of infection. The teaching has been that curettage should not be practiced in cases of infection. This is a very sane teaching, as during curettage the protective leucocytic layer which acts as a bar to the further spread of infection, is removed by the curette. Nevertheless, in view of the fact that nearly every endometrium is diseased in cases of metrorrhagia with history of infection, a curettage should be performed in every case of metrorrhagia where the operator does not contemplate the removal of the uterus.

Cases 39 and 61 bear upon this subject and bring out another interesting point in reference to curettage. In Case 39 a young woman 26 years old, with one child, was suffering with a severe metrorrhagia of one month's duration. Her uterine adnexae were apparently normal. She was curetted and the specimen showed endometritis with round-cell infiltration. Subsequent history showed that she was relieved of all symptoms. In contrast to this case of beneficial curettage is Case 61.

She is also a young woman twenty-three years old, who has been suffering with repeated attacks of metrorrhagia for five years. She was laparotomized and a bilateral salpingectomy done. The specimen showed subacute salpingitis and round-cell infiltration. She was not curetted and while she is relieved of the symptoms of salpingitis her metrorrhagia did not improve and a curettage is indicated for relief of symptoms. A curettage at the time of operation would have been the proper procedure. In these cases the sharp curette, which is the instrument to be used, removes pathologic tissue debris, and in that way benefits the condition. Whether the curettage is of temporary or of

permanent benefit is another question. There is, however, no doubt that the temporary benefit of the curettage is certain and definite.

Neoplasms.—Under the third group, there were 38 cases, tabulated in Chart IV. The study of this chart shows that there were eight cases of cancer of cervix; 26 cases of fibroids and four cases with uterine polyps. The endometrium was affected in nearly every one of the 38 cases. What was the cause of the uterine bleeding in these cases? In eight there was the cell destruction which is present in all carcinomas. In Case 72 there was a history of uterine bleeding for a year, in a

Uterine Bleeding
CHART No IV-a
NEOPLASMS 38 CASES
Pathologic Report

No	Uterus	Cervix	Endometrium	Uterine Glands	Uterine Tubes	Ovaries	Duration of Metrorrhagia	Age	Number of Pregnancies	Operation
1	Normal	Carcinoma	Hyperplastic	Hyperplastic	Normal	Normal	4 Months	62	2	Dxl Radium 100 mg 24 hrs
5	Carcinoma	Carcinoma	Carcinoma	Carcinoma	"	"	3 Months	58	None	Radium Application
8	"	"	Atrophic	Atrophic	"	"	1 "	40	1	" "
10	"	"	Carcinoma	Carcinoma	"	"	3 "	31	None	" "
14	"	"	"	"	"	"	3 "	36	4	" "
17	Fibroid	Normal	Adeno-myometritis	Penetrate Musculoris	"	Fol. cysts	3 Years	35	None	Supra-vag. Hysterectomy Rt Salpingo-oophorectomy
20	Adeno-myoma	"	No inflammatory changes	Penetrate Musculature	"	"	3 "	42	"	Supra-vag Hysterectomy Bil salpingo-oophorectomy
21	Polyp at fundus	"	Round cell Infiltration	Not stated	"	"	3 Months	40	"	Pan Hysterectomy Left salpingo-oophorectomy
22	Several Fibroids	"	Thickened	Premenstrual Changes	Diseased	"	2 "	44	2	Supra-vag Hysterectomy Bil. Salpingo-oophorectomy
24	Carcinoma	Carcinoma	Carcinoma	Not stated	Normal	"	2 "	42	2	Radium Application
32	Large Myoma sub-mucous	Normal	Pale and hemorrhagic	" "	Hyperhemic	Hemorrhagic Cysts	6 "	56	4	Supr-vag Hysterectomy Bil Salpinge-oophorectomy
35	Uterine Polyp	Polyp protrudes	Premenstrual Mucosa	Premenstrual	Normal	Normal	10 "	45	4	Removal of Polyp Radium Application
41	Fibroids	Normal	Oedema polyposum	Hyperplasia	"	Corpus luteum Cyst	1 Year	Not stated	0	Supr-vag. Hysterectomy Bil. Salpingo-oophorectomy
43	Carcinoma	Carcinoma	Carcinoma	Carcinoma	"	Normal	2 Months	56	1	Radium Application
44	Fibroids	Polyp protrudes	Interval	Interval	"	"	3 "	48	2	Removal of Polyp and Radium Application
46	Large Fibroids	Normal	Thickened	Premenstrual	Thickened Round cell infiltration	Large cyst Hemorrhagic	8 years	34	1	Supra-vag. Hysterectomy Bil.salp-oophorectomy
49	Fibroids	"	Hyperplasia	Hyperplasia	Normal	Corpus luteum Cyst Hemorrhagic	6 Months	38	None	Supra vag Hysterectomy Rt salp-oophorectomy
56	Sub mucous Fibroid	"	Thickened oedematous	Normal	"	Cyst	3 "	47	"	Supra-vag Hysterectomy Left salp-oophorectomy
62	Multiple sub-mucous Fibroids	"	Thin	Cystic Glands	"	Ou. Cyst	1 Year	39	"	Supra-vag Hystero-Bil Salpingo-oophorectomy
66	Fibroids	"	Very thin destroyed by Jodin	Not stated	"	Normal	9 "	39	3	Pan-Hysterectomy Bil sala-oophorectomy
67	"	"	Thin No obm change	"	Hydro-salpinx Plasicece pleriae	"	2 "	43	None	Supra vag Hysterectomy Bil sala-oophorectomy
68	"	"	Hemorrhagic Oedematous	Premenstrual	Normal	"	3 "	43	1	Supra-vag Hysterectomy Bil. salp-oophorectomy

woman 45 years old, the clinical diagnosis was carcinoma of the cervix, but the pathologist reported only necrotic tissue. The clinical diagnosis is the correct one. The pathologist did not receive a proper specimen for examination. Subtracting the eight cases of carcinoma, where the cause of bleeding is well known and readily understood, there are left 30 cases of fibroid of uterus, for the study of the cause of uterine bleeding.

Careful analysis shows that in the 30 cases of fibroids, the neoplasm was responsible for the bleeding in only 17 cases or in 55 per cent. In 11 cases out of the 30 the cause of the bleeding was infection of the

endometrium, the tumors having nothing to do with the bleeding. In other words, in 35 per cent of cases of fibroids of the uterus, the disturbance in menstruation and uterine bleeding is not caused by the neoplasm but is due to infection of the uterine endometrium, the cause of the bleeding being precisely the same as in cases of infection of the generative organs, namely diseased endometrium.

CHART No IV-b

No	Uterus	Cervix	Endometrium	Uterine Glands	Uterine Tubes	Ovaries	Duration of Metrorrhagia	Age	Number of Pregnan's	Operation
70	Large Tumor Large/much over	Normal	Thickened and oedematous	Premenstrual	Hyperaemic	One Ovary Cystic infiltra	2 Years	43	1	Supra-vag Hysterect Bil salp-oophorect
72	Normal	Carcinoma Accredibilized	Normal	Not stated	"	"	1 "	45	4	D&C Radium
73	Multiple Fibroids	"	Very thin	Glands penetr. Myoma	Normal	Normal	6 Weeks	39	2	Supra-vag Hysterect Bil salp-oophorect
75	Fibroids	"	Not stated	Not stated	"	Corpus lut-eux cyst	3 "	32	0	Myomectomy Appead Removal of ovar'n cyst.
77	Degeneris inf'a mural Fibroid	"	Normal	Normal	"	Normal	6 Years	30	Single	Supra-vag Hysterect
78	Adenoma Polyposum	Polyp protrudes	Hemorrhagic	Cystic	"	Serous Cyst	1½ "	?	"	Bil salp-oophorect
79	Very large Fibroid	Normal	Very hyperaemic Adenoma polyposum	Not stated	"	Bothcystic Large cysts	5 "	35	"	" " "
80	Sub mucous Fibroids	"	Hemorrhagic No other change	"	"	Normal	2 "	34	0	Supra-vag Hysterect
81	Myoma Uteri	"	Thin premenstrual	Premenstrual	"	"	6 "	31	"	Left salp-oophorect.
84	Large Myoma	"	Adenoma polyposum	Not stated	"	Corpus Luteum Cyst	8 Months	?	"	Right " " "
92	Large Fibroid	"	Thickened Round cell infiltra	Penetrate Muscularis	Salpingitis Isthmicanodosa	Serous Cyst	5 "	41	2	Pan Hystero-double salp-oophorect.
93	Leiomyoma multiple sub-mucous Fibroid	"	Hemorrhagic Area	Not stated	Normal	Normal	3 Years	33	1	Supra-vag Hysterect.
95	Large Polyp	Polyp protrudes	Not stated	"	"	"	2 "	42	3	Removal of Uterine polyp No bleeding later
96	Fibroids	Normal	Round cell infiltrate Hemorrhagic Foci	"	"	"	6 Months	52	1	Supra-vag. Hystero-Bil salp-oophorect.
97	"	"	Oedematous	Hyperplastic	"	Small foreign Cyst	7 Years	36	Single	Supra-vag Hysterect Left salp-oophorect
98	Sub-mucous Myoma	"	Oedematous Hemorrhagic	Not stated	"	Normal	2 full term average	42	1	Bil.salp-oophorect.

Summary of the Causes of Uterine Bleeding in Cases of Neoplasms
Seven Causes

	Cases				
1	8	Carcinoma Nos 1-5-8-10-14-24-43-72	21%	Condition of Uterine Adnexa	
2	7	Adenoma polyposum of Uterus or Cervix 35-41-44-78-79-84-95	20%	Uterine Tubes	Ovaries
3	11	Endometritis 21-22-46-66-67-68-70-81-92-96-97	30%	Normal 32	Normal 25
4	6	Sub-mucous Fibroids 32-56-62-80-93-98	16%	Diseased 6	Diseased 13
5	3	Penetrating uterine glands 17-20-73(92 infl)	8%	Total 38	Total 38
6	2	Hyperfunction of Ovaries 49-75			
7	1	Degeneration of Neoplasm 77			

In the 38 cases tabulated there were seven different causes encountered for the uterine bleeding, from a pathologic point of view. These seven different causes are as follows:

1. Cause—8 Carcinoma .... 21 per cent
2. Cause—7 Adenoma polyposum of uterus .... 20 per cent
3. Cause—11 Endometritis .... 30 per cent
4. Cause—6 Submucous fibroids .... 16 per cent
5. Cause—3 Penetrating uterine glands .... 8 per cent
6. Cause—2 Ovarian hyperfunction
7. Cause—1 Degeneration of neoplasm and necrosis

From the study of these cases, I find that a polypoid condition of the endometrium appears to be a frequent cause of uterine bleeding. In Group II it was found that the above-mentioned condition was respon-

sible for uterine bleeding in 20 per cent of cases. The same is true of the third group of cases,—here again the condition was encountered by the pathologist in 20 per cent of cases or seven times.

What is this condition of the endometrium that is responsible for uterine bleeding in so large a number of cases? The pathologist calls the condition ''adenoma polyposum uteri.'' It is a soft adenomatous structure of the endometrium containing large numbers of uterine glands and has a tendency to bleed. Ulceration in the form of a break in the surface epithelium occurs frequently on these polypoid structures and the loss of blood is from these areas of ulceration. These polypoid growths also suffer from edema and infection which is shown under the microscope by a round-cell infiltration. When polyps of larger size develop out of an endometrium so affected, the polyps protrude through the cervical canal and another mechanical factor is introduced which may cause uterine bleeding, namely, pressure necrosis of the polyp with cell destruction and escape of blood. Some of these polyps bleed very profusely and dangerous degrees of anemia may develop. Very frequently in necrosis of uterine polyps, an inflammatory reaction occurs in the myometrium and also in the uterine wall, introducing a dangerous factor, which may cause death from sepsis. From a surgical point of view these cases of necrosed polyps with sepsis are very poor surgical risks.

Polypoid condition of the endometrium is a pathologic entity that demands attention as an etiologic factor in uterine bleeding. It is the cause of menstrual disturbance and uterine bleeding in 20 per cent of all cases, whether the underlying factor is infection or neoplasm. I am inclined to believe that an invasion of the endometrium by microorganisms is a factor in the formation of this polypoid condition of the endometrium. It is, however, possible that endocrine disturbance may be an etiological factor. Be this as it may, adenoma polyposum uteri is a frequent cause of uterine bleeding and occurs in at least 20 per cent of all cases.

In 30 per cent of cases of this group of uterine bleeding with neoplasm, the cause of the bleeding must be ascribed to infection of the endometrium. We have here 11 cases in which the pathologist finds an inflammatory reaction in the endometrium and nothing else to account for the uterine bleeding. While these cases all had fibroids of the uterus, the uterine bleeding was due to a pathologic endometrium, the neoplasm playing but a secondary rôle in causing the hemorrhage.

In six cases of this group the specimens showed a submucous fibroid, which was responsible for the uterine bleeding. The specimens show that the uterine mucosa overlying these submucous tumors, undergoes a pathologic change. The mucosa becomes thin, the uterine glands

disappear or become fewer in number. In some cases the mucosa becomes fibrous and edematous and in others a hemorrhagic condition develops in the mucosa overlying the neoplasm. These pathologic conditions developed in 16 per cent of cases. It is a distinct pathologic entity and must be classed as one of the causes of uterine bleeding in fibroids of the uterus. The escape of blood takes place from the diseased mucosa. This pathologic change in the mucosa depends on the neoplasm directly. Whether this pathologic change in the mucosa is due to a pressure necrosis from the tumor or is a distinct disease by itself as a result of the neoplasm, is not known. The fact remains that in about 16 per cent of cases of uterine bleeding, submucous fibroids are found. The mucosa overlying these neoplasms becomes diseased and blood escapes from this damaged mucosa.

Another pathologic condition was encountered in these cases which is of interest. It was found that in three cases the uterine glands penetrated the musculature of the uterus to a very extensive degree. I shall speak of these three cases in detail, because it is important to determine whether this condition of penetrating, profuse and extensive proliferation of uterine glands, can be one of the causes of uterine bleeding in neoplasms of the uterus. From the study of these cases, I believe that extensive proliferation and penetration of uterine glands can readily be the cause of persistent uterine bleeding, because it is a disease of the uterine gland itself.

The history of these cases is as follows:

Case 20.—Patient 42 years of age, never pregnant, was suffering with metrorrhagia for three years. She had a good sized tumor in the uterus. A supravaginal hysterectomy and a bilateral salpingo-oophorectomy were done. When the specimen was examined, it was found that there was an adenomyoma of the uterus. The endometrium had no inflammatory changes. The tubes and ovaries were normal. The only pathologic change found in the specimen was an extensive proliferation of the corpus glands with deep penetration into the muscularis. In this case there is no other way to account for the severe metrorrhagia of three years' standing but to accept this pathologic change in the uterine glands as the cause of the uterine bleeding. In Case 17, the patient was 55 years old and had also a metrorrhagia of three years' standing. The specimen showed an adenomyometritis and penetrating uterine glands with no other abnormalities. In Case 73 we have the same condition. The patient was 39 years old, she had two children. There was a multiple fibroid of the uterus. After operation the specimen showed penetrating uterine glands with no other pathologic changes to account for the bleeding. In Case 92 the pathologist also reports penetrating uterine glands, but in this case, the endometrium also showed round-cell infiltration so it was not included among these cases. This case, however, is an additional proof and further shows that this condition of penetrating uterine glands and extensive proliferation, is a pathologic manifestation of uterine glands and is frequently encountered. It is something that should be taken into consideration, as a cause of uterine bleeding in neoplasm of the uterus.

In one case the pathologist noted that the uterine bleeding was due to degeneration of the tumor itself. It was in Case 77. The patient was a single woman, thirty years old, who was suffering with metrorrhagia for six years. A hysterectomy was done and the specimen showed a degenerated fibroid. The tumor itself was bleeding into the uterine cavity, as a result of cell destruction. While it is not advisable to theorize from one single case, and make deductions, it must be admitted that it is in the demain of great possibilities that a degeneration of a neoplasm occurs and can result in uterine bleeding. Be this as it may in this case here reported, no other deductions could be made. The uterine bleeding was caused by the breaking down of the neoplasm and therefore this condition of degeneration of the fibroid tumor itself is put down as one of the causes of uterine bleeding.

Uterine Bleeding
CHART No V.
DISPLACEMENT, CONGESTION AND LACERATIONS of UTERUS   13 CASES
Pathologists Report

No	Uterus	Cervix	Endometrium	Uterine Glands	Perineum	Ant Vag Wall	Tubes	Ovary	Duration of Bleeding	Age	No of Pregn's	Operation	Results
26	Retroverted	Lacerated	Not stated	Not stated	Lacerated	Normal	Normal	Normal	2 Mths	28	2	Trachelorrhaphy Perineorrhaphy Ext Alexander	was delivered normally since operation
37	Normal Gilliam 4 mos	Repaired 4 mos before	Hyperplasia	Hyperplasia	Repaired 4M before	"	"	"	4 "	38	Single	D&C Red 50mg 12bm	Excellent result, menses normal after 8 months
55	Retroverted	Lacerated	Not stated	Not stated	Lacerated	Cystocele	"	"	2 Yrs	42	2	D&C Repair Cystocele Shortening Rd Lig of Uterus Appendectomy	Excellent result
57	"	Lacerated Mal Cell Infiltration	"	"	Normal	Normal	"	"	3 Mths	27	1	D&C Amputation of Cervix Simpson operation	Excellent result
59	Normal	Lacerated	No material obtained by curettage		Lacerated	"	"	"	6 Wks	50	2	D&C Amputation of Cervix Repair of Pelvic Floor	Good result
71	"	"	Interval	Interval	"	"	"	"	2 Mths	41	?	D&C Amputation of Cervix Perineorrhaphy	Very good result No bleeding
74	Retroverted	Moderate Laceration	Not stated	Not stated	Moderately Lacerated	"	"	"	9 Wks	26	2	Shortening Round Ligament of Uterus	Good result Pregnancy followed soon after
82	Normal	Lacerated	Premenstrual Hemorrhagic	Premenstrual	Lacerated	"	"	"	2 Mths	36	2	D&C Amputation of Cervix Perineorrhaphy Hemorrhage	Good result No bleeding
85	Retroversion	"	Not stated	Not stated	Moderately Lacerated	"	"	"	1½ Yrs	22	1	Shortening Round Ligaments Appendectomy	Good result No bleeding
88	"	"	Interval	Interval	Not stated	"	"	"	3 Yrs	20	1	D&C Shortening Rd Ligaments Appendectomy	No report
89	"	"	Not stated	Not stated	"	"	"	"	Cystic	?	28	2	Shortening Round Ligaments Left oophorectomy	No report
91	"	Normal	"	"	"	"	"	"	?	25	None	D&C Shortening Round Ligaments	Good result No bleeding
94	"	Moderate Laceration	Interval	Interval	"	"	"	"	6 Mths	40	3	D&C Shortening Rd Ligaments Appendectomy	Partial success Bleeding less

Summary of Causes of Uterine Bleeding in Cases of Displacement and Laceration — 2 Causes

	CASES		
1	9	Vascular Engorgement in Retroversion	26-55-57-74-85-88-89-91-94
2	4	Focal Infection in Lacerations	37-59-71-82

Displacements.—There are 13 cases of uterine bleeding tabulated in Chart V, where the diagnosis was made of displacement of the uterus and lacerations. The cases of uterine bleeding in this group are the most difficult of interpretation as to the cause of the bleeding. Nine cases had retroversion of the uterus and in four the uterus was normally placed. One of these four had an operation for retroversion four months previously. All of the cases had lacerations either of the cervix, anterior vaginal wall or perineum. The condition of the endometrium and uterine glands was not stated in eight cases. In the five cases subjected to pathologic examination, the endometrium and uterine glands were found of the interval type in three cases, hyperplasia in one case and premenstrual in one case. It is very apparent that there was no pathology found in the endometrium and corpus

glands in these cases. In fact the only pathology found in this group
of cases is the displacement of the uterus and laceration, and on this
pathology must depend the uterine bleeding.

A few cases may be of interest in detail. Case 26, the first on the chart, was
a woman of 28 who had two pregnancies. This patient suffered with uterine
bleeding for two months prior to the operation. She has a retroverted uterus
and laceration of the cervix and perineum. She had a plastic operation and an
external Alexander for shortening the round ligaments. No other pathology was
found to account for the uterine bleeding of two months' standing. Case 59
with laceration of cervix and perineum was a woman of thirty years old with
uterine bleeding of 6 weeks' duration. No other pathology to account for the
uterine bleeding. She was curetted and nothing found in the uterine cavity.
A plastic operation relieved her symptoms. Case 94,—retroversion and moderate
laceration of cervix. Patient 40 years old, with uterine bleeding of 6 months'
duration. A curettage showed an interval mucosa,—no other abnormality, ad-
nexae normal. Shortening of the round ligaments brought relief of symptoms.

What is the cause of the uterine bleeding in this group of cases?
Does a retroverted uterus cause uterine bleeding? How are we to ex-
plain uterine bleeding in cases of lacerations? We must explain uterine
bleeding in cases of retroversion on the basis of vascular engorgement.
Emmet called attention to this chronic vascular engorgement in dis-
placements many years ago. The blood supply of the pelvic organs
is peculiar to itself, and the anatomic arrangements are such that
displacement of the uterus disturbs the physiologic balance between
the arterial influx of the blood on one hand and the venous outflow
on the other. There results not only a venous engorgement in the
uterus but the arterial influx is also disturbed. This vascular disturb-
ance must bring about changes in the endometrium which causes uterine
bleeding, though the changes in the endometrium cannot be demon-
strated with the microscope. In the cases of lacerations another factor
is introduced which must have an important bearing on uterine bleed-
ing, namely, focal infection. The cervix with its many glands as a
result of the laceration and influenced by the displacement becomes
a prey to the invasion of microorganisms and a chronic endocervicitis
results. This focal infection brings about changes in the endometrium,
which though undemonstrable, causes the persistent uterine bleeding.
On no other basis can the uterine bleeding be explained in this group
of cases. In Case 57 there was a uterine bleeding of three months'
duration, in a woman 27 years old. The cervix was amputated and
round-cell infiltration found. There were no other abnormal findings.

From the study of these cases we must admit that uterine displace-
ment and lacerations are etiologic factors in uterine bleeding, and that
the uterine bleeding is due to changes in the endometrium which cannot
be demonstrated by the pathologist, due to chronic vascular engorge-
ment and chronic focal infection.

I come now to a class of cases of uterine bleeding, where the cause of the bleeding was put down as ovarian hyperfunction. I shall speak of these cases with a certain amount of diffidence. There were two cases belonging to this class under neoplasm and nine cases in a group by themselves. What is meant by ovarian hyperfunction causing uterine bleeding? The conception is, that as a result of an endocrine disturbance, the ovary functionates beyond a physiologic degree. This hyperfunction of the ovary or corpus luteum keeps the endometrium and uterine glands constantly in a state of hyperplasia and engorgement. In other words the patient keeps on menstruating without a physiologic limit: a physiologic process at first becomes a pathologic one later. In this manner a hyperovarian function becomes an etiologic factor in uterine bleeding.

The history of the two case of hyperovarian function under neoplasm is as follows: Case 1 was a patient thirty-eight years old, with no pregnancies, who was suffering with uterine bleeding for six months. She was operated and a supravaginal hysterectomy and a right salpingo-oophorectomy were done. The pathologist found the endometrium and corpus glands normal except for a hyperplasia. There was a hemorrhagic corpus luteum cyst in the right ovary, the conception being that the diseased ovary was overfunctioning. The second case is identical with the first. The patient was thirty-two years old, no pregnancies, with a metrorrhagia of three weeks' standing. A myomectomy was done and a corpus luteum cyst removed. No other abnormality was found to account for the metrorrhagia. In both of these cases the uterine bleeding was associated with the corpus luteum cyst of the ovary and a possible hyperovarian function.

As said before, I speak of ovarian hyperfunction as a cause of uterine bleeding, with hesitation. An earnest discussion is invited on this subject. Is this a pathologic entity or not? Is it an actual fact that the ovary functionates beyond its physiologic limit or does it only exist in the endocrinologist's imagination? There are very few facts at hand bearing on the ovarian function, upon which argument *pro* and *con* can be based. We do not know in what manner the ovary is influenced by the other ductless glands of the body or *vice versa*. This however we do know, that the product of the pituitary glands affects the uterine tissues most profoundly and we also know that in hypothyroidism with metrorrhagia, the uterine bleeding is promptly controlled by thyroid medication. With these facts before us, it must be admitted that there exists a physiologic endocrine balance, between the ductless glands of the body and a disturbance in this balance may result in an overproduction of hormones in the corpus luteum of the ovary which may keep the endometrium in a state of hyperplasia, resulting in uterine bleeding. Further than this one cannot go into the matter except to state that the therapeutic administration of corpus luteum, ovarian residue, and whole ovary, is at times followed by therapeutic results that are very definite in action.

There are nine cases tabulated in Chart VI where the uterine bleeding was believed to be caused by an overfunction of the ovaries. It will be found by examining Chart VI that in only one, No. 13, of these nine cases was the abdomen opened. In this case a corpus luteum cyst was found enlarged. All the other cases had apparently normal ovaries. However, the ovaries may not be enlarged sufficiently to become palpable in examination and yet manifest a disturbed function. The disturbed function may not rest on a definitely demonstrable change in

Uterine Bleeding
Chart No. VI.
Endocrine Distress   9 Cases
Pathologic Report

No	Endometrium	Uterine Glands	Uterine Tubes	Ovaries	Duration of Bleeding	Age	Number of Pregnancies	Operation	Result
2	Hyperplasia	Hyperplasia	Normal	Normal	6 Months	36	None	Nitric Acid to Endometrium	No Bleeding
13	Premenstrual Myometrium Normal	Premenstrual	,,	Corpus luteum Cyst	,, ,,	30	,,	Supra vaginal hyst. Left salpingo-oophorectomy	
28	Normal	Indefinite Type	,,	Enlarged?	3 Wks	?	Single	D&C	No further Report
38	Hyperplastic	Cystic Glands	,,	Normal	5 Months	41	2	D&C Rad. 50mg 12 hr.	Could not be found
52	Premenstrual	Premenstrual	,,	,,	4 Months as of Menopause	49	None	D&C Rad 100mg 24 hr	Private Patient?
60	Hyperplastic	Hyperplastic	,,	,,	3 Months	48	2	D&C Divulsion & Curettage	No Report
63	Interval Type	Interval Type	,,	,,	,, ,,	36	2	D&C Divulsion & Curettage	No Bleeding Very good result
64	,,	,,	,,	,,	,, ,,	38	3	D&C Divulsion & Curettage	No Bleeding Good result
87	,,	,,	,,	,,	9 ,,	46	Single	D&C	No Report

Summary of Causes of Uterine Bleeding
Hyper-ovarian Function

Constitutional Causes
Blood Discrasie
2 Cases

No			Uterine Bleeding	Operation	Result
16	Chronic Endocarditis	Acute Thyroiditis	2½ Years	Radium 100mgs 24 hrs	Tardy Relief
69	Fibrosis Uteri	Fibrosis of Myometrium	2 years	Hysterectomy	

Records not complete   2 Cases   No 11 · 34

the ovary itself, but may depend on a disturbance in the physiologic balance between the various ductless glands of the body. In none of the nine cases here tabulated, could one discover any of the other causes of uterine bleeding enumerated before.

Therefore for the want of a better term, and for the want of a better known cause for the bleeding, the cause of uterine bleeding in these nine cases is described as ovarian hyperfunction.

There were two cases of uterine bleeding that were classed under constitutional causes. One was a patient 52 years old with a severe metrorrhagia. She was suffering with an acute endocarditis and an

acute state of hyperthyroidism. There were no local findings to account for the uterine bleeding. Radium brought a tardy relief. The second case tabulated here was one of fibrosis uteri. I have placed this case in this class because the greatest pathologic change is found in the blood vessels. In fact the endometrium was fairly normal. The adnexa were normal. Fibrosis uteri may have an infection as a basis of its etiology, but I could not place the case under infection because it does not conform with the other cases so classified.

The study of the 100 cases of uterine bleeding here reported brings

UTERINE BLEEDING
CHART VII
Causes of Uterine Bleeding in 100 Cases.
14 Causes

1 Abortion, all types.

2 Ectopic Gestation.

3 Low Implanted Placenta.

4 Chorio-Epithelioma.

5 Inflammatory Reaction in the Endometrium

6 Polypoid Condition of the Endometrium.

7 Carcinoma.

8 Sub-Mucous Fibroids.

9 Penetrating Uterine Glands.

10 Degeneration of Uterine Fibroids.

11 Hyper-ovarian Function.

12 Vascular Engorgement.

13 Focal Infection.

14 Constitutional Causes.

out the fact that there were no less than 14 different causes for the bleeding enumerated as shown in Chart VII.

SUMMARY

1. From the study of the pathologic findings in the 100 cases of uterine bleeding here reported, it is found that the cases may be divided into six classes according to the etiologic factors that are causing the loss of blood from the uterus.

2. That the pathologic changes in the endometrium play the greatest rôle in uterine bleeding and that this occurs in 70 per cent of cases divided as follows: In 34 cases infection plays the important rôle in causing endometrial pathology. In 25 cases neoplasm causes the dis-

turbance in the endometrium and in the remaining 11 cases the endometrium is disturbed by a hyperfunction of the ovaries.

3. That the uterine bleeding is caused also by vascular engorgement of uterus and adnexa and focal infection of the generative organs.

4. That pregnancy including ectopic gestation plays a very important rôle in causing uterine bleeding, having been found present in 13 cases.

5. That constitutional causes play a very minor rôle in causing uterine bleeding.

6. That after incomplete abortion the endometrium undergoes the physiologic change incident to menstruation, although the uterine cavity

Uterine Bleeding
CHART VIII

Conclusions

Uterine bleeding
Classified according to Etiology

1ˢᵗ Pregnancy
2ⁿᵈ Infection
3ʳᵈ Neoplasms
4ᵗʰ Displacement & Lacerations
5ᵗʰ Endocrine Distress
6ᵗʰ Constitutional Causes

Neoplasms 38 Cases
Causes of Bleeding (Seven)

1ˢᵗ Carcinoma	8 Cases
2ⁿᵈ Adenoma polyposum	7 "
3ʳᵈ Endometritis	11 "
4ᵗʰ Sub-mucous Fibroids	6 "
5ᵗʰ Penetrating Uterine Glands	3 "
6ᵗʰ Hyper-function of Ovaries	2 "
7ᵗʰ Degeneration of Neoplasms	1 " Total 38

Infection 23 Cases
Causes of Bleeding (Four)

1ˢᵗ Endometritis	11 Cases
2ⁿᵈ Polypoid Condition of Endometritis	4
3ʳᵈ Various Phases of Menstruation	1
4ᵗʰ Oedema of Endometrium	2
Not stated	5 Total 23

Uterine bleeding in 70% due to
Endometrial Pathology

Infection	34 Cases
Neoplasms	25 "
Hyper-ovarian Function	11 " Total 70

Pregnancy 13 Cases
Causes of Bleeding (Four)

1ˢᵗ Abortion	8 Cases
2ⁿᵈ Ectopic	3 "
3ʳᵈ Malposition of Placenta	1 "
4ᵗʰ Chorio-Epithelioma	1 " Total 13

Displacements & Lacerations 13 Cases
Causes of Bleeding (Two)

1ˢᵗ Vascular Engorgement	9 Cases
2ⁿᵈ Focal Infection	4 " Total 13

Endocrine Distress 9 Cases
Causes of Bleeding (One)
Hyper-ovarian Function

Constitutional Causes 2 Cases
Causes of Bleeding (Two)

Endocarditis & Thyroiditis	1 Case
Fibrosis Uteri	1 "

may harbor retained secundines which cause continued uterine bleeding as shown in Cases 7 and 36.

7. That in cases of uterine bleeding with history of infection, the bleeding is due to a diseased endometrium, the adnexae remaining perfectly normal. This fact is shown by Cases 3, 30, and 39.

8. That curettage of the uterus is a very important procedure in cases of uterine bleeding, as the bleeding may depend entirely on the condition of the endometrium, in spite of the fact that other pathologic entities may be present, such as diseased adnexa, fibroids, etc. This point was strikingly illustrated in Case 61; the removal of diseased tubes failed to benefit the bleeding, while a curettage brought relief.

9. That in cases of uterine bleeding two or more causes may be operative in the same case at the same time as in Case 29, where there was a

cervical polyp present, a fibroid of the uterus and an incomplete abortion.

10. That adenoma polyposum of the endometrium is responsible for a large number of cases of uterine bleeding, at least 20 per cent, and is a distinct pathologic entity.

11. That when uterine glands penetrate the musculature they may be the cause of uterine bleeding, shown by Cases 17, 20, and 73.

12. That there are a certain number of cases—11 in the 100 cases here reported—of uterine bleeding, where the cause of the bleeding is obscure, where no pathologic changes are found to account for the bleeding, and where we have to fall back upon the theory of endocrin distress. These have been called cases of ovarian hyperfunction.

13. That there are a certain number of cases where the uterine bleeding depends on displacements and lacerations, the bleeding being due to vascular engorgement and "focal infection."

14. That submucous fibroids cause uterine bleeding by bringing about changes in the endometrium overlying the neoplasm.

15. That in a very small number of cases, uterine bleeding may be caused by a degeneration of the neoplasm; the necrosis bringing about cell destruction and escape of blood directly into the uterine cavity.

40 EAST FORTY-FIRST STREET.

HEMORRHAGIC LESIONS OF THE PLACENTA AND THEIR RELATION TO WHITE INFARCT FORMATION*

By F. P. McNalley, B.S., M.D., and Wm. J. Dieckmann, B.S.,
St. Louis, Mo.

From the Department of Obstetrics, Washington University School of Medicine.

ONLY a small part of the extensive literature on placental infarcts is devoted to the so-called red infarcts, and this term has been loosely used by different authors to describe different lesions. So far as we can determine there is no generally accepted definition of this term. We have chosen to call all red lesions hemorrhagic and have attempted to distinguish between red infarcts and other conditions which should not be so called, and to demonstrate what relation, if any, they have to white infarcts.

Our routine method of examination of placentae is as follows: They are washed free of blood and placed in 10 per cent formalin and allowed to remain in this solution about seven to ten days. They are then described in gross and cut in slices about 2 cm. thick. This enables us to detect lesions in the substance of the organ that would otherwise be missed. Blocks are taken for microscopic study from all areas showing anything unusual.

Up to the time this work was started we had examined three hundred and twenty placentae, at or near full term, and were struck with the frequency of hemorrhagic lesions, which were noted in one hundred and twenty-three cases, or 38 per cent. These have been variously termed: apoplexy, (Cruveilhier, Jacquemier, Gierse, Meckel, Scanzoni and Williams); hematoma, (Klebs); hemorrhage, (Kuehnel, Simpson, Rokitansky, Brindeau and Nattan-Larrier); hepatization, (Bracket and Scanzoni); red infarcts, (Williams, Young and others).

The terms "apoplexy" and "hematoma" seem to have been given to dark-red, circumscribed areas. Williams states that he has had occasion to examine them in but a few instances, but believes they differ essentially from other forms of infarcts. Kuehnel seems to have the same lesion in mind when he describes hemorrhages into preformed cavities. Brindeau and Nattan-Larrier give three forms of hemorrhage: The first, a hemorrhagic nodule formed by hemorrhages of varying size into the substance of the placenta, the apoplexy of other authors; second, diffuse hemorrhage in the substance of the placenta, apparently the hepatization described by others; third, retroplacental hemorrhage.

---

*Read before the St. Louis Gynecological Society, April 14, 1922.

The term "red infarct" is applied by Williams to two different lesions. First, pinkish or brick-dust colored masses, irregularly shaped, more or less solid, and sharply marked off from the surrounding tissue and occasionally occupying a large portion of the placenta; and second, round areas varying from bright red to almost black in
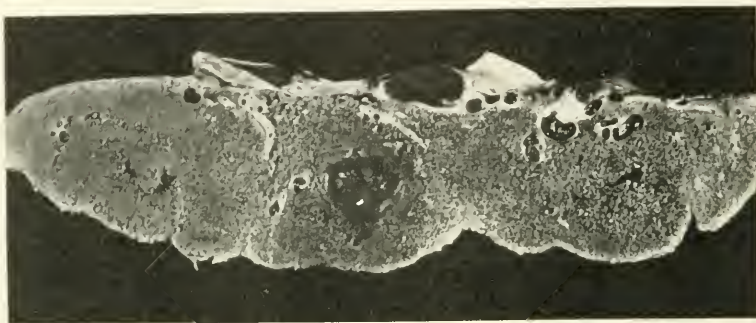
Fig. 1.—Showing two types of hematomata, the large circumscribed one in the center and at either end the smaller ones not circumscribed, as described in text.
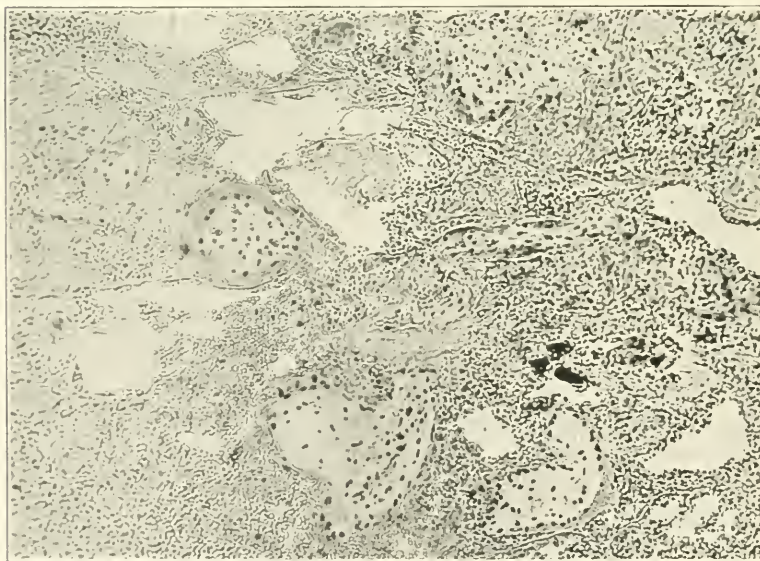
Fig. 2.—Thirteen weeks' abortion. Villi without vessels showing infarction. They are widely separated by marked hemorrhage.

color, which are apparently composed almost entirely of blood and are sharply marked off from the surrounding tissue by a capsule which presents a more or less fibrous appearance. These have also been spoken of as apoplexy. The first kind, he says, is closely related to the ordinary white infarcts, and differs from them only in the fact that a greater number of red blood cells are enclosed in the meshes of the fibrin network by which the degenerated villi are bound to-

gether. We have not found anything in our study to correspond to this description.

The red infarcts of Young are entirely different from those of Williams. He believes that white infarcts are red in the beginning. He says, ''In the earliest stage recognizable to the naked eye the patch is deep red, purple, or even black. It may not be visible until thrown in relief against the surrounding paler placenta which has lain for some days in a fixing solution into which the unclotted blood of the intervillous spaces has oozed. Microscopically in this stage the color is due to the engorgement of villi with blood. The whole appearance in this stage closely simulates the vascular hyperemia and stagna-

Fig. 3.—Microscopic picture of the smaller hematomata shown in Fig. 1, showing practically normal villi surrounding blood.

tion which occurs in other tissues when there is any lowering of vitality. It is an evidence of a local reaction which precedes the local death that is inevitable when the blood supply is cut off. As the process goes on the infarct becomes paler and finally white, due to the disappearance of the hemoglobin. In association with these vessel changes there are other changes in the infarct. The villi are closely packed together, the maternal spaces being empty or nearly so, the villi lie opposed to one another, or there may be actual fusion of the epithelial surfaces. Eden explained this as being due to a progressive diminution of blood supply to a part of a cotyledon by obstruction of a maternal artery, which would cause the villi to become crowded together because there would not be sufficient blood to maintain their normal distance from one another.''

That obliteration of maternal arteries does take place before labor is shown by Goodall in his work on involution of the uterus. He describes changes in the arteries of the uterus of a woman forty-four hours after labor that must have taken days for their development. "The changes present in the vessel walls, particularly in the elastic coats during involution, are present, but have gone on to a complete
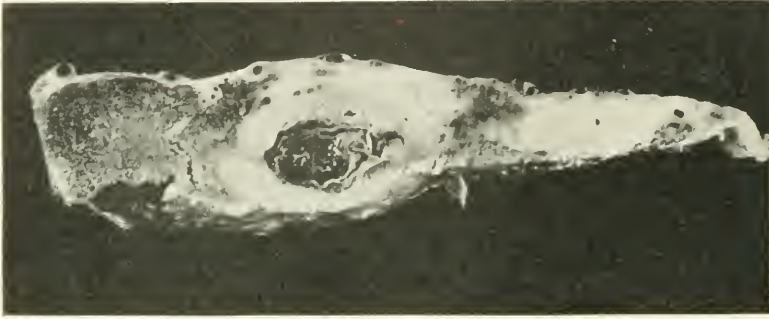
Fig. 4.—Large hematoma surrounded by white infarct, most of which is formed from villi.
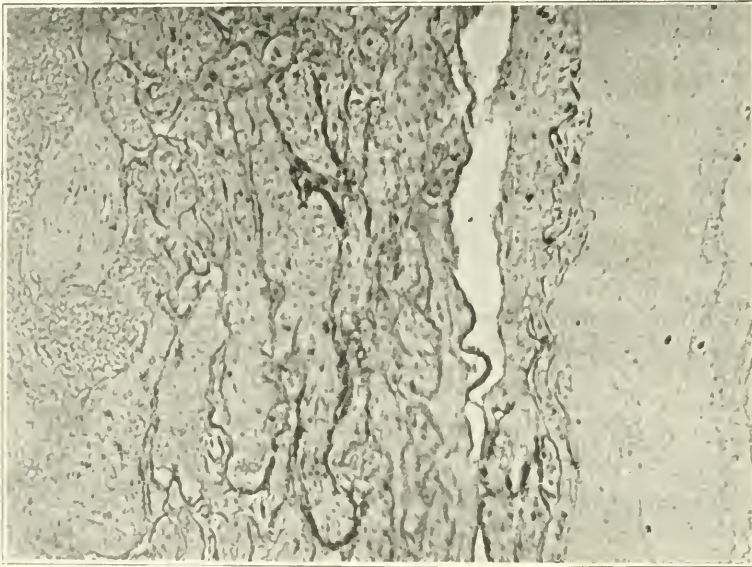
Fig. 5.—Microscopic picture of Fig. 4, showing, to one side, white infarct formed from villi, and to the other, fibrin formation in blood clot, resembling white infarct.

obliteration of the lumen or a narrowing of its calibre by these changes and by thrombus formation." He goes on to say, "That there is a close connection between these changes and the presence of so-called placental infarcts, I have but very little doubt. The presence in such a specimen as this, in numbers much greater than in the average parturient uterus, is quite in accord with the multiplicity of

placental infarcts found in placentae of women suffering from renal disease." If obliteration of an artery can affect an isolated portion of the placenta, it means that different portions of the placenta are nourished by different vessels and there is not a free communication of the maternal sinuses. Young believes this is so because injection of coloring matter in the center of a lobule will demonstrate its isolation and also because the fissures between the cotyledons are occupied by solid partitions of decidua.

Young believes that the villi are not dependent on their own vessels for nourishment but on the maternal blood, and gives as his reasons: (1) The time when the chorionic elements are most active and proliferate most rapidly is during the early stages of development and before there are any fetal vessels formed. (2) In hydatid mole the villi proliferate and there are no fetal vessels. (3) In tubal pregnancy where blood supply from the ovum has been cut off by hemorrhage, but where the maternal circulation is unimpaired the tips of the necrotic villi remain healthy. He states that retroplacental or intraplacental hemorrhages are the cause of infarct formation because they do interfere with the maternal supply to the affected part, but does not apply the term "red infarct" to them.

It is not our purpose in this paper to take up the whole subject of white infarct formation and we include this work of Young because in our own study we found one "hemorrhagic lesion" that answers Young's gross description and three others that answer his microscopic description. One small cotyledon, 3 cm. in diameter, at the margin of the placenta was dark red in color and rather firm, with a slightly paler area about ½ cm. wide at one margin. Microscopically the dark red portion showed the engorgement of the villi and close packing of the villi described by Young, and the paler portion showed his later stage, the hemoglobin less in amount, cells taking the stain poorly and the villi in places fused and in places showing a thin layer of fibrin about their periphery, such as can be seen in almost any infarct.

Besides the lesion above described, we have found three other types. (1) Cavities, varying in size from that of a pinhead to ½ cm. These are always irregular in outline, with no clear-cut margin, and have the appearance of being formed by wide separation of the villi. Most of these contain blood but a few are empty. Of the hundred and twenty-three placentae showing hemorrhagic lesions, we found eighty-seven with these cavities, or 70.7 per cent (Fig. 1.) Microscopically they bear out the appearance described in gross, i.e., there is no clear-cut margin, the cavity having the appearance of being formed by a wide separation of the villi, with the latter protruding into it much like the branches of a tree. The blood, when present,

has the appearance of fresh blood, there being no tendency for fibrin formation such as is seen strikingly in our third type of lesion. Except in one case, infarct formation in the surrounding villi is practically absent. In this case the presence of normal vessels in the villi is very noticeable, showing that infarct formation is possible without there being an endarteritis. This has been very noticeable in all the white infarct formation involving villi and associated with hemorrhagic lesions.

We have also found infarcted villi in a very early placenta associated with hemorrhage. This was from a woman thirteen weeks pregnant who took a rough automobile ride three days before abortion. The specimen in the gross consisted of a mass of placental tissue

Fig. 6.—Early stage of transformation by fibrin formation of a blood clot, as seen in Fig. 1, into what resembles white infarct in gross.
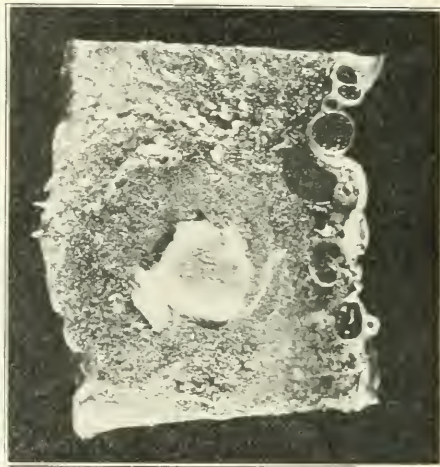
Fig. 7.—Later stage of same process seen in Fig. 6.

8 cm. × 2 cm. On section it was densely infiltrated with blood, making it impossible to recognize placental tissue. Microscopically it showed small numbers of villi which showed infarction in all stages. This is a case (Fig. 2) showing infarction where there are no fetal vessels, the maternal supply cut off by hemorrhage, probably traumatic.

Our second type is that in which the whole, or a large part of the placenta is densely infiltrated with blood, the organ being heavy and very thick in comparison to other placentae; it is spongy and oozes dark red, sometimes almost black blood, and to this the term "hepatization" might well be applied. This condition we found in eight cases, or 0.65 per cent of the hundred and twenty-three. In seven of these cases we also found the cavities first described. Microscopically

they show nothing characteristic except that all the intervillous spaces are large and filled with blood.

The third type, and the one which we believe is probably the same as the first but more extensive and which plays an important part in
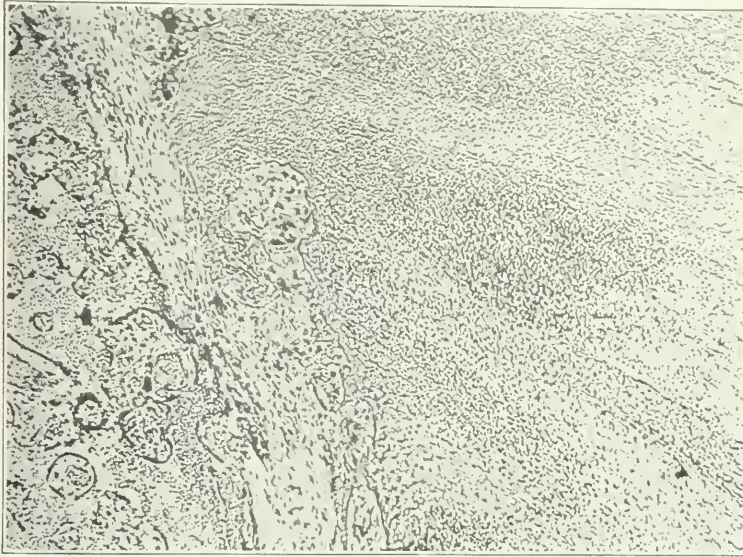
Fig. 8.—Microscopic picture of Fig. 7. Layers of fibrin with spaces between filled with red blood cells.

Fig. 9.—A very large hematoma being converted into white infarct. Notice white striations of fibrin being laid down in the blood clot.

the formation of at least some white infarcts, occurred in forty-three cases, or 35 per cent. These correspond to one kind of Williams' red infarcts, the apoplexy of other writers, and the intraplacental hemorrhages of Young. We propose to show that starting

with a collection of pure blood these become converted into structures that in the gross have the identical appearance of white infarcts, but in whose formation villi play no part.

These collections of blood differ materially from those first described in that they are always larger, varying from 0.5 to 3 cm. in diameter, some irregular in shape, but many round or oval. They are definitely circumscribed, having a clear-cut margin and early show nothing like a capsule, in the gross appearing merely as a collection of blood surrounded by normal placental tissue. In this stage microscopically they show merely a blood clot, the surrounding villi being normal or showing slight white infarct formation. This infarct formation may remain slight or there may be a large area of surrounding villi that undergoes the changes described by Young and forms a white infarct. This white infarct formation seems to be explained by Young's theory of interference with the maternal supply by the collection of blood. Where it is not so extensive, there al-

Fig. 10.—Hematoma just beginning to show fibrin formation.
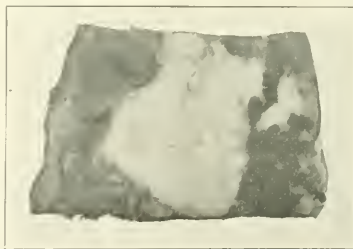
Fig. 11.—A mass identical in appearance with white infarct, formed from a hematoma, which, in gross cannot be distinguished from the ordinary white infarct. This is from the same placenta as Fig. 10.

ways being some, we assume the adjacent areas to be supplied by other vessels. We do not believe this appearance of blood surrounded by infarcted tissue can be called a hemorrhage into white infarct as has been claimed by some authors.

Independent of this infarction the collection of blood itself undergoes the changes which convert it into a mass analogous to white infarct in the gross. This is in accord with the findings of Dieulafoy who says, "The lesion is characterized by the appearances of hemorrhages, which are converted into white infarct. The primary lesion is hemorrhagic; the white infarct is secondary. The recent infarct contains fluid blood, or having a gelatinous consistency, is almost black in color. When the infarct is older it becomes pale, the coloring matter of the blood disappears and finally reaches the tint of a white infarct. If the infarct is incised it appears to be formed of fibrin,

more or less dense in appearance and sometimes disposed in a series of concentric layers. In the center we often find a small collection of colored fluid forming the residue of the blood serum.''

Cruveilhier in his article on apoplexy stated that he had observed a complete series of cases which demonstrated the transformation of ordinary apoplexy into the pale, white, fibrous areas. Shaffer considers that many of the small subchorial infarcts are the result of the organization of localized hemorrhages. De Lee says, ''organization of the clot occurs and it is possible to trace the changes through the stages of (1) soft, red-black clot; (2) brick-red, firmer masses; (3) fibrin formation in the periphery; (4) through and through hard, fibrous nodule.''
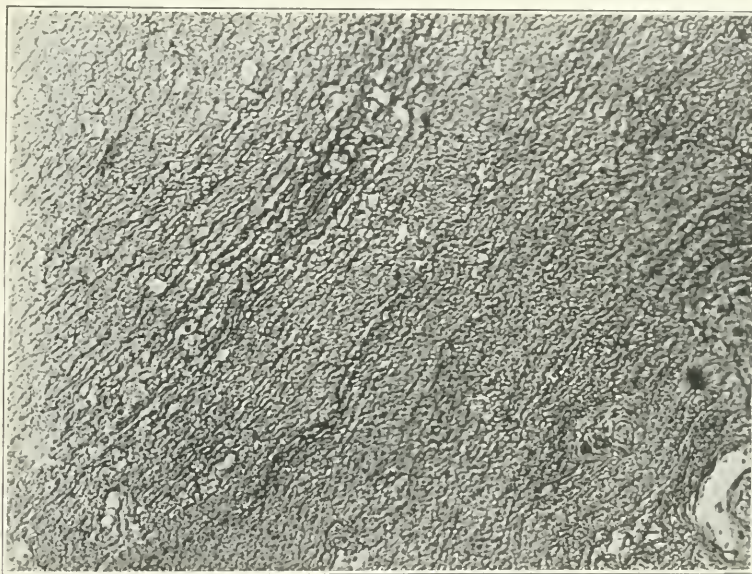
Fig. 12.—Microscopic picture of Fig. 11, showing fibrin with few red blood cells caught in its meshes. No evidence of any villi.

Williams disagrees with these authors and thinks these lesions differ essentially from other forms of infarcts, believing endarteritis is the chief etiological factor in white infarct formation.

In the fresh collection of blood already described there appear striations near one margin, slightly lighter in color than the remainder of the clot. These increase in number and become paler, giving the whole clot a pink rather than a red color, with white striations throughout. As the process goes on the color becomes whiter, the striations become wider and closer together until, as in one of our specimens, it has the identical appearance in gross of a white infarct (Fig. 11). The microscopic appearance corresponds with the gross. The striations are layers of fibrin being formed, the red blood

cells are becoming fewer and the fibrin more abundant, giving the appearance of a laminated clot. We are able to follow the decrease in red cells and the increase in fibrin throughout the progressive stages to the typical white infarct in gross which still shows a few red cells caught in the infarct. There are no villi involved in this process, the blood itself being converted into the white infarct. The different stages, both gross and microscopic, are shown in Figs. 3 to 12. There is no evidence in any of our sections of organization as it is usually understood, i.e., proliferation of fibrous tissue and in-growths of new vessels.

That hemorrhage can be the origin of white infarct we believe is even more clearly shown in another specimen, a white infarct, 3 cm. in diameter, on the maternal surface which, on section, is seen to
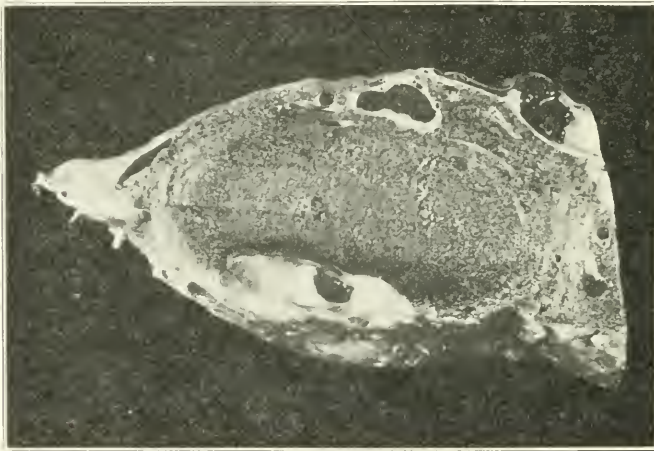
Fig. 13.—This was originally a retroplacental hemorrhage which on the surface looks like the usual white infarct. Notice small clot still remaining in center.

extend 1 cm. beneath the surface. In the center of this infarct is a blood clot 1 × 0.5 cm., seen in Fig. 13. Microscopically (Fig. 14) this clot is seen surrounded by layers of fibrin in which a few red blood cells can still be distinguished. Separating this infarct from the placental tissue about its entire margin is a layer of decidual tissue, the picture one sees in a retroplacental hemorrhage, which condition we believe this infarct originally was, being converted into a white infarct by the process described above, leaving the small collection of blood still in its center.

We believe that the three types of lesions above described have a common etiology.

In considering the question as to the origin of these collections of blood, the first thing to be determined would be whether it is fetal or maternal in origin. If fetal, it is evidently due to rupture of a fetal

vessel and is a true hemorrhage. Brindeau and Nattan-Larrier have observed this but we have not been able to confirm it. If, on the other hand, it is maternal blood, such a term could not be applied, for, as Williams says, "The intervillous spaces are in themselves blood vessels, and we are hardly justified in speaking of hemorrhage into blood vessels."

We have not been able to definitely decide the origin of the blood but feel at the present time it is probably maternal. If such is the case, the most logical explanation would be back pressure due to venous stasis from thrombosis, the size of the lesion being in proportion to the extent of inference with the return flow. This is pointed
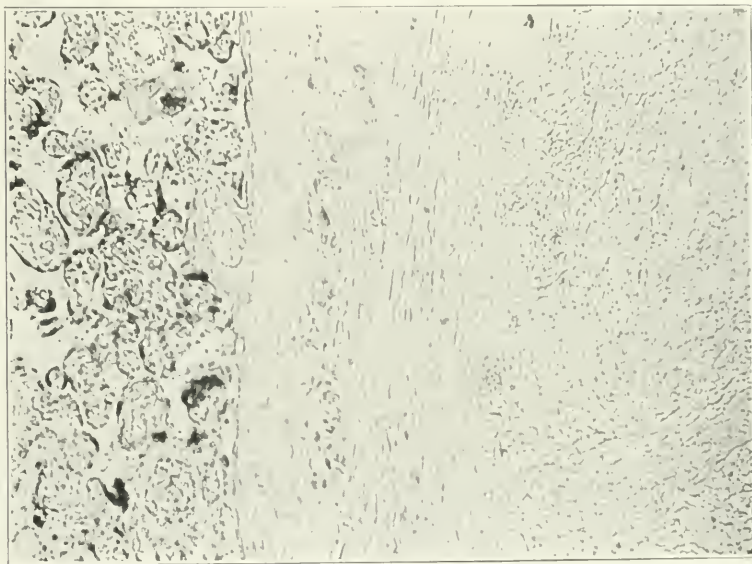
Fig. 14.—Microscopic picture of Fig. 13, showing villi on one side, fibrin on the other, and between decidual cells.

out clearly by Young and advanced by him as the origin of retroplacental hemorrhages. Goodall, in speaking of changes in the veins before labor, says, "In the smaller veins of the placental area there is usually a complete obliteration due to the building of a thrombus." Schilling believes that in some cases there is a thrombosis originating in the maternal vessels of the decidua and then gradually spreads to the intervillous spaces.

In all our cases there were only four of toxemia, one of which is mentioned above. Aside from this one the lesions were no different from those found in our normal pregnancies. It is interesting to note that many authors find "red infarcts" and albuminuria closely associated. Rouhaud, in 1882, noted that 40 per cent of the cases which had albuminuria had red infarcts and 40 per cent of these had dead

infants. Many other authors have shown similar relationship. There were four stillborn infants in our series, two of which were in toxemic cases and the other two accounted for by other factors. These cases had lesions similar to the others where the infants were in good condition.

<div align="center">CONCLUSIONS</div>

(1) At least some of the usual white infarcts resulting from changes in the villi may be red in color at first as described by Young. To this the term "red infarct" is applicable.

(2) The other lesions that have been variously termed should not be called red infarcts, because in reality they are not infarcts but collections of blood, to which the term "hematoma" or "hepatization" might be applied, depending on whether circumscribed or diffuse. They have a common etiology.

(3) The maternal blood is of primary importance in nourishing the villi, as pointed out by Young.

(4) Collections of blood in the placenta may be the beginning of white infarcts in two ways, (a) by the actual conversion of the blood itself into a white infarct, which in the gross does not differ from any other; (b) by causing infarction of the surrounding villi as the result of interfering with maternal circulation.

(5) There can be white infarct formation without endarteritis in the fetal vessels. Whether this is true in all infarcts we are not prepared to say at the present time.

<div align="center">REFERENCES</div>

Brachet: Quoted by Williams. *Brindeau and Nattan-Larrier:* Quoted by Williams. *Cruvielhier:* Quoted by Williams. *De Lee:* Textbook of Obstetrics. *Dieulafoy:* Textbook of Medicine, Translated by Collins and Lieberman, ii, 1904. *Eden:* Jour. Path. and Bacteriol., Edinburgh and London, 1897, iv, 265. *Gierse:* Quoted by Williams. *Goodall:* Studies from the Royal Victoria Hospital, Montreal, ii, No. 3. *Holland:* Jour. Obst. and Gynec. of the British Empire, 1909, xvi, 255, 325, 384. *Jacquemier:* Quoted by Williams. *Klebs:* Quoted by Williams. *Meckel:* Quoted by Williams. *Rokitansky:* Quoted by Williams. *Scanzoni:* Lehrbuch der Geburtshülfe, 1853, ed. 2. *Simpson:* Edinburgh Medical Journal, vol. xlv, p. 266. *Shaffer:* Quoted by Williams. *Talbot:* Surg., Gynec. and Obst., 1921, xxxii, 552. *Young:* Jour. Obst. and Gynec. of the British Empire, 1914, xxvi, 1.

503 WALL BUILDING.

BLOOD STUDIES IN NORMAL PREGNANCY*

By O. S. Krebs, B.S., M.D., and A. P. Briggs, B.S., St. Louis, Mo.

(From the Department of Obstetrics, Washington University School of Medicine.)

THERE has been, probably, no more fertile field for investigation than that offered by various abnormal conditions that present themselves during pregnancy. Just one of them, eclampsia, has a very extensive literature dealing with the many theories of its causation, but as yet the exact nature of the underlying cause is not known.

Various investigators tell us of the value of urine study in the toxemias of pregnancy; others have emphasized the rather questionable value of a determination of the nonprotein nitrogen in contrast to the clinical course, blood pressure and urinary findings; another has pointed out the value of the noncoagulative nitrogen coefficient; and still others mention that high nonprotein nitrogen of which the urea nitrogen forms a small percentage, is characteristic of toxemia of the hepatic type; and finally others say that the blood pictures in eclampsia and toxemia are interpreted most readily in terms of kidney insufficiency. Thus we find that blood studies which have been confined largely to the nitrogenous constituents are valuable in considering the diagnosis and prognosis of the various disorders of pregnancy but throw no light on the exact nature of the toxemia, or the source of the toxins.

Another line of investigation seemed reasonable to assume as perhaps being able to throw some light on the various abnormal conditions that obtain during pregnancy. An investigation of the inorganic constituents of the blood was therefore proposed, the investigation being reported having taken into consideration bloods of the normally pregnant woman.

A review of the literature, as can be seen from the following, has shown that the inorganic constituents of the blood in pregnancy have been rather indifferently investigated. Calcium and magnesium have been the elements most frequently determined and the nephritides were the favorite clinical sources of the bloods; the toxemias of pregnancy being rather superficially studied.

In 1906, Silvestri estimated that the calcium content of a fetus increases rapidly toward the end of term and feels that this must be a great drain upon the mother, especially during that time.

In 1908, MacCallum and Voegtlin[1] in studying the relation of tetany to parathyroids, say that in osteomalacia and rickets there is evidently a common source which leads to the decalcification of the bones and other tissues and consequently to tetany. Whether this depends on a lesion of the parathyroids as Erdheim suggests, remains to be determined. In the tetany which accompanies pregnancy and lactation, however, it can easily be believed that there is no organic lesion of the parathyroid glands, but that the decalcification of the tissues is directly due to the extraordinary drain upon them in the production of the bones and other calcium rich tissues of the fetus, or in the secretion of milk which has a large calcium content. Further, they say that numerous researches have shown the important relation of the calcium salts to the excitability of the central nervous system.

In 1915, Mitchell[2] reported a new theory of eclampsia on the basis of calcium deficiency. He says that the calcium theory explains many clinical features of eclampsia, viz., the greater frequency at term; the greater frequency in twin pregnancy; the nervous excitability and convulsions; the delayed coagulation time of the blood; the decayed teeth; the urinary findings; the associated edema; the eclampsia of lactation and the newly born; the well-known cessation of convulsions under mild diet.

In 1916, Howland and Marriott[3] investigating the calcium content of the blood in rickets and tetany stated that in the majority of normal cases the calcium varies between 10 and 11 mg. per 100 c.c. of blood serum.

In 1916, Marriott and Howland[10] in studying the acidosis of nephritis in regard to phosphate retention in the blood, said that the retention of acid phosphate would seem to be sufficient to account for the degree of acidosis observed. That the high phosphate content is due to interference with a specific function of the kidneys and not to increased phosphate production in the body or increased absorption from the intestinal tract is shown by the fact that the urinary output of phosphate is not increased and indeed may be diminished. The accumulated phosphates of the serum, even though neutralized, are capable of doing serious harm to the organism. The amount is sufficient to have a definite influence on the osmotic pressure. This suggests a possible connection with the phenomena of edema and hydremia. Marriott and Howland have found further, in most of the cases studied, a marked reduction in the calcium of the serum. What influence this low calcium content may have in the production of such symptoms as convulsions and hemorrhages can only be suggested. The low calcium content they refer to the excess of phosphates in the plasma. They say that it has been shown repeatedly that phosphates administered in any form cause an increased elimination of calcium, chiefly by way of the intestines; the converse is also true.

In 1917, Lyman[4] reported the average calcium content of the blood for males as 6.1 mg. per 100 c.c. of blood, while that of females was 7.1 mg.

In September 1917, Halverson, Mohler and Bergeim[11] published an article on the calcium content of the blood serum in certain pathological conditions. In pernicious vomiting of pregnancy they found the value for serum calcium was normal, the excretion of calcium, ammonia and acid was very high. After alkali administration there was an immediate drop in calcium excretion to less than 10 per cent of the normal value. Similar rapid decrease in acidity and ammonia were noted. Apparently calcium excretion increased with an excessive acid production. Distinct decreases in calcium content were noted in cases of hematogenous jaundice, eclampsia, pneumonia, and particularly uremia. The normal range was from 9 to 11 mg. of calcium per 100 c.c. The authors emphasized the great constancy of calcium in the serum as compared with most blood constituents.

In 1920, Denis and Minot[5] concluded that the result of a study of the effect

of the administration of calcium salts by mouth to men, cats and rabbits indicates that in most cases it is impossible to increase the concentration of calcium in the plasma by injection of calcium salts, but that in cats and rabbits where the initial concentration is low, it is sometimes possible to greatly increase the amount of calcium in the plasma by feeding salts of the element.

In 1920, Underhill, Honeij and Bogert[6] in studying calcium and magnesium metabolism in disease, stated that it is evident that with normal subjects in negative calcium balance, added calcium causes the balance to become positive, and that the additional calcium exerts little or no influence upon the magnesium balance. The influence of added calcium is, however, only temporary, since its withdrawal results in a resumption of a significant negative calcium balance. Added magnesium changes a slightly negative magnesium balance to a strongly positive one without a very significant influence upon the calcium balance.

Blair Bell,[7] in ''The Sex Complex,'' 1921, says concerning calcium metabolism that it is differently employed at three different periods of life. Until puberty, calcium is chiefly utilized in building up the skeleton; after this epoch, for reproduction, and lastly and pathologically, if the termination of life be pathological, for producing changes which are associated with senility, namely, the retention of lime salts in the tissues, especially the arteries. The calcium metabolism is directly influenced by most of the internal secretions. Some, such as infundibulin and suprarenin, induce the retention of calcium salts in the blood and tissues— that is to say, they are anabolic in respect to these salts; while others, such as the thyroid and ovarian secretions, are katabolic. Consequently, as lime salts themselves have a pressor action, an indirect effect of this nature is produced on the vasomotor system by those secretions which lead to the retention of calcium compounds in the blood quite apart from their own specific actions. Considering parathyroid secretion, Bell says that all that concerns the calcium metabolism, closely concerns the reproductive functions; consequently the parathyroids may be involved in many disorders of menstruation, pregnancy, and lactation, although as yet there is little direct evidence that this is so. Erdheim has stated that in osteomalacia he has found hyperplasia of the parathyroids. If this exceed that found normally in pregnancy, it is probable that this change indicates an attempt on the part of these organs to prevent the excessive secretion of lime salts which occurs in osteomalacia, for it has been shown that after removal of the parathyroids there is a deficiency of calcium salts in the tissues. Tetany of pregnancy is attributed to insufficiency of parathyroid secretion and the experiments of Vassale and Generali, and Adler and Thaler, appear to bear out this view. These observers found that partial parathyroidectomy may give rise to no symptoms unless the animal be pregnant, when tetany is prone to occur, or to follow parturition. It is, therefore, more than probable that the tetany which may be seen in the human subject during the later stages of pregnancy is associated directly or indirectly with the metabolism of calcium and the control of this metabolism by the parathyroids.

Vassale believes that insufficiency in the parathyroids is to be found in eclampsia,—a toxemia which he thinks may be successfully treated by an extract of these organs. It seems likely that this method of treatment acts indirectly— that is, calcium retention is promoted and excessive acidosis, so constant in this disease, is prevented. It has been suggested by Silvestri that excessive vomiting of pregnancy may be due to suprarenal insufficiency, and this writer claims to have treated hyperemesis successfully by the administration of suprarenin. If this be so, the therapeutic effect is somewhat complicated; the suprarenal being damaged by the toxemia of pregnancy allows an excessive excretion of lime salts,

and the loss of calcium may induce a condition of acid intoxication with associated vomiting. Again, it will be remembered that Bossi has shown that osteomalacia may be relieved by injections of suprarenin, and that this author concluded that in this disease there is a suprarenal insufficiency.

In 1921, Myers and Short[8] stated that the potassium content of normal human blood serum amounts to rather less than 20 mg. per 100 c.c., while for whole blood the figures are from 8 to 12 times this amount. In a series of seven nephritics with marked nitrogen retention, no increase in potassium content of the serum or whole blood was noted. The authors say that these few observations do not lend support to the suggestion of Smillie that some of the symptoms of uremia may be due to potassium poisoning as a result of retention of this element.

Kramer and Tisdall[9] in the same Journal, reported values for various of the inorganic constituents of the blood. These figures were: Sodium, 175 to 225 mg. per 100 c.c.; potassium, 153 to 201 mg.; calcium, 5.3 to 6.8 mg.; magnesium, 2.3 to 4.0 mg. The concentration in the normal blood varies more than in normal serums due to variation in the corpuscular content of the blood.

The data we have obtained are in the nature of a preliminary report to studies we expect to carry on at some future time. Our cases were women with clinically normal pregnancies, taken at various periods of gestation. Normal cases were studied first so that a comparison could be drawn with the study of pathological bloods which we hope will follow. In conjunction with a determination of the inorganic constituents, certain of the nitrogenous elements and sugar content were estimated, so that if at any time any unexpected interpretation might be suggested that we would have the figures of a rather complete blood study for possible corroboration.

Table I shows the tabulated figures in our series.

The inorganic determinations were made in the Department of Biological Chemistry by A. P. Briggs. Sodium was estimated by the gravimetric method of Kramer[12]; potassium by an unpublished colorimetric method by E. A. Doisy of the Department of Biochemistry, Washington University School of Medicine; calcium by a volumetric permanganate-oxalate method; magnesium by a colorimetric method by A. P. Briggs (now in press); phosphorus by a modification of the colorimetric method of Bell and Doisy[13]; chlorides by a volumetric method of McLean and Van Slyke[14]. The nitrogenous elements were determined by the Folin-Wu[15] methods and sugar by the Shaffer-Hartmann[16] technic.

The results of the study of blood with special reference to the inorganic constituents shows a great constancy of all the elements in normal pregnancy, regardless of the period of gestation, with one exception, namely, that in the last weeks of pregnancy our few cases showed the calcium content to be slightly lowered. This latter finding is in accord with the ideas of MacCallum and Voegtlin, who emphasize the drain on the maternal organism by the demands of the fetus and in lactation. Halverson, Mohler and Bergeim mention

TABLE I

CASE	AGE	GRAVIDA	GESTATION	ALBUMIN (URINES)	SUGAR (URINES)	BLOOD PRESSURE	N. P. N.	UREA	URIC ACID	CREATININE	SUGAR	SODIUM	POTASSIUM	CALCIUM	MAGNESIUM	PHOSPHORUS	SODIUM CHLORIDE
I	21	I	8	0	0	108/60	23.7	10.3	3.0	1.7	.078%	311	21.3	9.9	2.69	2.16	587
II	29	III	8	0	0	115/75	27.6	10.0	3.1	2.1	.079%	296	....	10.0	2.5	2.93	575
III	25	II	9	0	0	98/54	30.7	11.8	2.0	2.2	.111%	309	19.9	9.3	2.5	3.2	625
IV	31	II	11	0	0	96/68	21.5	9.5	3.3	2.3	....	....	20.9	9.7	2.5	3.2	576
V	28	VIII	12	0	0	98/50	24.4	....	2.5	2.2	.107%	289	24.1	9.3	2.35	2.9	575
VI	29	III	16	0	0	98/62	30.0	10.3	2.6	2.7	.113%	334	24.0	9.05	2.18	2.4	620
VII	29	III	16	0	0	108/62	30.0	10.5	2.1	1.8	.100%	286	28.6	7.5	2.12	1.08	563
VIII	14	I	18	0	0	122/60	31.5	9.7	3.3	2.7	.123%	289	22.9	7.8	2.15	1.39	576
IX	20	III	21	0	0	104/48	29.4	....	3.4	2.6	.085%	305	26.2	9.6	2.3	2.8	600
X	24	III	24	0	0	120/55	34.3	10.5	....	2.0	.122%	327	22.3	9.25	2.64	2.7	595
XI	28	I	26	0	0	128/70	25.0	11.1	3.8	2.5	.078%	318	18.3	9.35	2.26	3.3	525
XII	18		28	0	0	110/68	24.0	10.2	2.2	2.0	.124%	323	26.1	9.66	....	3.8	595
XIII	28		28	0	0	88/40	31.5	10.5	2.6	1.9	.071%	319	24.7	8.8	2.5	2.7	600
XIV	16	III	34	0	0	110/55	30.0	9.9	2.3	2.4	.103%	293	....	9.36	2.2	3.06	587
XV	15	I	37	0	0	102/62	34.2	9.3	2.3	2.1	.118%	301	23.8	8.1	2.4	2.51	617
XVI	30	V	40	0	0	112/64	40.0	11.1	3.5	2.3	.085%	....	25.7	9.0	2.32	2.96	565
XVII	22	I	40	1	0	135/100	26.0	8.6	4.2	2.4				8.45	2.68	2.94	567

the constancy of calcium and Myers and Short the constancy of potassium in normal bloods.

REFERENCES

(1) Jour. Exper. Med., 1909, xi, 118. (2) Med. Rec., 1910, lxxviii, 906. (3) Am. Jour. Obst., lxxiv, p. 541. (4) Jour. Biol. Chem., 1917, xxx, 1. (5) Jour. Biol. Chem., 1920, xli, 357. (6) Jour. Exper. Med., 1920, xxxii, 41. (7) The Sex Complex, 1921. (8) Jour. Biol. Chem., xlviii, 83. (9) Jour. Biol. Chem., xlviii, 223. (10) Arch. Int. Med., 1916, xviii, 708. (11) Jour. Biol. Chem., 1917, xxxii, 171. (12) Jour. Biol. Chem., 1920, xli, No. 2, p. 263. (13) Jour. Biol. Chem., 1920, xliv, No. 1. (14) Jour. Biol. Chem., 1915, xxi, p. 361. (15) Jour. Biol. Chem., 1919, xxxviii, No. 1. (16) Jour. Biol. Chem., 1921, xlv, No. 2.

RENAL COLIC ASSOCIATED WITH URETHRAL CONDITIONS IN WOMEN*

By E. MacD. Stanton, M.D., F.A.C.S., Schenectady, N. Y.

THE patients comprising the group of cases which I wish to describe have long been recognized by gynecologists and urologists as presenting attacks of typical renal colic but with rather indefinite pathologic findings. Some surgeons, notably Hunner of Baltimore, would have us believe that the pain in many of these cases is due to stricture of the ureter. Hunner believes that true stricture of the ureter is actually a common condition and that our failure to diagnose these cases properly is simply because we fail to recognize the stricture. The attitude of Hunner on this subject was clearly stated in his paper before the New York State Society meeting in 1919, when he said, "In the three and one half years since my first paper, I have diagnosed and treated about 500 cases, and I have had the satisfaction of instructing or inspiring other men in different sections of the country to take up this work and they have obtained similar results. It has been a source of interest to receive letters from some of these men, saying they are finding so many cases that they doubt the accuracy of the technic. I have had the same doubts and misgivings many times in my own work, and it is only because of the satisfactory results to the patient that I am still firm in my belief in the accuracy of my conclusions. I believe I have demonstrated that ureteral stricture is one of the commonest causes of abdominal symptoms in women."

I for one cannot agree with the above statements. In the first place a true stricture is a definite pathologic condition. Real strictures if they exist for any length of time are accompanied by the secondary results of the obstruction, namely, dilatation of the ureter or pelvis

---

*Read before the Ontario County Medical Society at Clifton Springs, N. Y., April 11, 1922.

above the stricture. Hundreds of thousands of autopsies have been performed with the minutest care by most competent pathologists. Were true ureteral stricture a common condition, it would long ago have been recognized as such through autopsy findings. As a matter of fact, simple strictures of the ureter are not commonly found at autopsy. Hydronephrosis or hydropyonephrosis is rather frequently found postmortem but in the great majority of cases it is due to prostatic obstruction, pressure of tumor growths, stone or other pathology not primarily caused by ureteral stricture.

With modern diagnostic methods, true strictures of the ureter are readily recognized. The findings, obtained by the use of the ureteral catheter and the injection of x-ray opaque fluids into the urinary tract are positive and for actual strictures are definitely characteristic. During the past ten years we have made routine use of the combined x-ray and cystoscopic diagnostic method in practically all cases presenting symptoms referable to the urinary tract. During this time our findings as regards the frequency of gross obstructive lesions of the upper urinary tract agree with what we would have *a priori* expected from previously reported autopsy series. We have encountered a considerable number of cases of hydroureter and hydronephrosis due to such causes as stone, pregnancy, pressure of tumor growths on the ureter and to anomalous vessels in the region of the pelvis of the kidney. Tuberculous strictures have been fairly common. All told, the above-mentioned causes including stone have accounted for less than half of the cases referred to us with undoubted histories of pain of renal origin. Colon bacillus pyelitis without demonstrable ureteral stricture, accounts for a few of the remaining cases; chronic nephritis, evidence of recently passed "gravel" or stones and miscellaneous other causes account for a few more cases but we still have a large proportion, roughly about one-third, unaccounted for.

When we come to the study of this residual group we encounter certain rather outstanding general facts. In the first place most of these cases are in women of the hypersensitive, sometimes definitely neurotic type. General experience with this type of patient has led all diagnosticians to expect rather major pain symptoms to be produced by relatively minor pathology.

I mention this factor of hypersensitiveness or hypersusceptibility to colic pains because I believe this type of patient should always be recognized and the pain susceptibility of the individual evaluated as a fundamental step in the diagnosis, no matter what the symptom complex.

The hypersusceptibility to pain, producing spasmodic contractions of the involuntary muscle tissue of the urinary tract, is, I believe, a

rather essential factor in the group which I wish to discuss. However, we also find in these cases a real pathology which I believe acts as an actual exciting cause for the attacks of renal pain.

The following history illustrates a typical case which has now been followed over a period of eight years and seven months:

Mrs. B., age forty-five, seen in consultation, February 11, 1913. She has always been fairly robust, but of a nervous, hypersensitive type. Seven years previously she was operated by Dr. Elting of Albany. The question of renal pain was discussed at that time but Dr. Elting could find nothing wrong with her kidneys and completed the operation by removing her left tube and ovary and appendix. Following the operation she thought she was better but she continued to have some bladder trouble and occasional pains in the left upper abdomen. She is the mother of one child. There was no history in any way suggesting pelvic infection.

During the past year she had had four very severe attacks of pain centering in the region of the left kidney. The last attack began the night before I saw her with pain over the bladder followed by suddenly developing very severe pain in the left kidney region which radiated downward along the course of the ureter. For two or three days following these attacks she had painful frequent urination. The first attack came on during the night, the second attack followed an automobile ride and the other attacks had, she thought, followed slight exertions.

General physical examination showed a well developed, well nourished woman. Skin of good color, temperature and pulse normal. Chest negative. Abdomen generally hypersensitive with marked tenderness over left kidney region and at Murphy's point posteriorly. Scar of old low median incision. Vaginal examination showed nothing noteworthy. X-ray examination of the entire urinary tract showed no evidence of stone.

Cystoscopic Examination.—At the external meatus there was a small caruncle-like area. The entire urethra appeared to be thickened and hypertrophied to vaginal palpation. Even after thorough cocainization the cystoscope was passed with difficulty and with great pain and caused some bleeding of the urethra. There was no evidence of a diffuse cystitis but the area of the trigone was markedly injected. The area of injection was most marked on the left side where it extended to the region of the left ureter which was surrounded by a well marked areola. Both right and left ureters spurted clear urine.

Because of the negative urine, the normally spurting ureters, and the fear of producing an attack of renal colic, no attempt was made to catheterize the ureters at this examination but at a subsequent examination they were easily catheterized with no evidence of obstruction or hydronephrosis.

The urine was clear, sp. gr. 1011. Slightest doubtful trace of albumin. (No albumin found on repeated subsequent examination), no sugar. Centrifuged specimen showed one cast and a few cells, mostly epithelial. No evidence of pus or active infection.

Following the cystoscopic examination she had no more attacks of renal pain until September 6, 1914, a period of nineteen months; then she had a prodromal period of bladder irritability followed by a typical attack of renal colic with lesser attacks extending over a period of about a month. Finally she consented to a cystoscopic examination, which showed a recurrence of the contracted urethra. Following this examination and ureteral dilatation to F30 with a Kollman dilator, she had relief until May, 1915, or eight months, when she felt a recurrence of the prodromal bladder irritation and returned for a urethral dilatation. Again in September, 1915, she returned to have her urethra dilated. I did not see her as a

patient again until January 11, 1917. She then reported that for sixteen months she had been free from trouble but that for the past four days she had suffered from a good deal of pain in the left kidney radiating down the ureter and accompanied by vesical symptoms. Dilatation of the urethra at this time immediately started up an attack of left renal colic but following this she remained practically free from trouble for more than two years or until the summer of 1919 when she again began to have vesical irritation followed by pain in the region of the left kidney and finally typical attacks of left renal colic. Some friend told her that repeated dilatations of the urethra would surely cause cancer of the urethra so she elected a course at a well-known Sanitarium where they made almost every known kind of a test except cystoscopic examination. She continued to have vesical irritability and repeated renal pains with occasional severe colics until she returned to me for a urethral dilatation March 11, 1920. X-rays again were negative. Urine showed nothing noteworthy. Cystoscopic examination showed a moderately contracted urethra. Slight trigonal cystitis, with some very minute ulcer-like areas in the region of the left ureteral opening. A catheter was easily passed into the left ureter but it caused much pain and immediately started up an attack of renal colic. Urine from both kidneys was sterile.

Following the dilatation of the urethra in March, 1920, she remained free from renal colic until July of last year. After a prodromal period of bladder irritation she had a typical attack of renal colic in the early part of July but with no further attacks up to the present time (April, 1922).

I have recounted the above history in some detail because it is typical of a group of cases which in my experience are relatively common and comprise a large proportion of those cases of renal pain in which definite organic obstruction or active infection of the proper urinary tract cannot be demonstrated by our modern methods of diagnosis.

We have now had a fair number of these cases under observation and in all of them the clinical picture and pathologic findings and the results of treatment have been relatively constant. Most of the cases have occurred in distinctly hypersensitive types of women. All have given a history of typical renal colic associated with bladder symptoms. In all we have found an anatomically or spasmodically contracted urethra. In many the urethra had been definitely thickened. In about half of the cases we have had to dilate the urethra under cocaine anesthesia before passing a caliber F26 cystoscope. In all cases there has been a moderate but definite trigonal cystitis with more or less involvement of the ureteral orifice on the side of the renal colic. The side involved is not necessarily constant in the same case. None of these cases have presented evidences of stone, ureteral stricture, hydroureter or hydronephrosis. The passing of the cystoscope often causes a temporary cessation of the ureteral squirt but when this nervous inhibition is suspended, the squirts resume with a normal rhythm. The ureteral catheters are easily passed. except that there is sometimes a temporary spasmodic holding of the catheter in the lower end of the ureter. The urine is as a rule nega-

tive, without evidence of colon bacillus or other forms of pyelitis. It is most interesting to correlate the symptoms and the pathology in this group of cases. The phenomena of renal colic can be produced at will by the cystoscopist and its mechanism studied by means of the x-ray and pyelography. Any stimulus which will set up a spasmodic contraction of the smooth muscle tissue of the wall of the ureter or pelvis is capable of causing renal colic. Individual patients differ very greatly as to the intensity or degree of stimulus required to produce these painful spasms. In the phlegmatic type of individual, the cystoscopist can catheterize the ureters, allow the catheters to remain in place for a considerable period of time while the urine specimens are being collected. and finally the pelvis of the kidney may be filled with sodium bromide solution for x-ray purposes with very little danger of causing an attack of renal pain. On the other hand, in the neurotic, hypersensitive type of individual, even though no lesions whatsoever can be demonstrated in the urinary tract, the cystoscopic examination, no matter how gently conducted, is very liable to be followed by a severe attack of renal colic. This fact again emphasizes the point that whenever the surgeon is called upon to determine the cause of the colic-type of pain. be it renal, uterine, intestinal or hepatic, the temperament of the individual and the relative susceptibility of the individual patient to pain-producing stimuli is a factor which ought always to be given due consideration. I believe that this hypersusceptibility is an important factor in determining the renal pains suffered by the group of patients under consideration. The actual pathologic findings are quite characteristic and constant and serve, I believe, to place these cases in a distinct group by themselves.

All of our patients belonging to this group have presented more or less evidence of a so-called trigonal cystitis with some involvement of the region of one or both ureteral orifices. In my experience the colic has practically always been on the side of the more marked involvement of the ureteral area. Urologists may differ as to the cause and nature of the so-called trigonal cystitis which may amount to little more than a definite injection of the vessels of this region. Although the general involvement of the ureteral region on the painful side has been definite in each case, this involvement has not been of the type to suggest either tuberculosis or stone. This trigonal injection may be secondary to the contracted urethra and in some way caused by the same. The fact that the painful spasms subside after dilatation of the urethra would lend support to this view.

The other pathologic finding which has been constant in my cases is a contracted or spasmodic urethra. In all cases this contracture of the urethra has been perfectly evident on attempting to pass an F26

cystoscope. In a number of cases we have had to dilate the urethra by other instruments before it was possible to pass the cystoscope at all. In about one-half of the cases the urethra when examined by vaginal palpation appears to be definitely thickened.

A working hypothesis for the correlation of symptoms and pathology in these cases may be stated as follows:

In the first place we have a patient of the hypersensitive type. She develops a slight nonspecific urethritis, certainly not an uncommon disease in women. This sets up a more or less spastic condition of the urethra and favors the development of a trigonal cystitis. When this trigonal cystitis involves the region of the ureteral orifice, this ureter is sensitized, so to speak, so that with slight stimuli it develops the ureteral spasms which are the real cause of the renal colic. It is quite possible that the renal colic starts with painful spasmodic contractures of the urethra following urination and that these contractures of the urethra are transmitted through the trigone to the ureter. At any rate, if the urethra be kept dilated, the trigonal cystitis tends to disappear and likewise the urinary irritability and the tendency to renal colic

146 BARRETT STREET.

BACTERIOLOGY OF FATAL SYSTEMIC INFECTIONS FOLLOWING MISCARRIAGE OR ABORTION

By Willson B. Moody, M.D., Chicago, Ill.

From The John McCormick Institute for Infectious Diseases and the Pathological Laboratory of the Cook County Hospital

THIS report is based on the bacteriologic examination of fluids and organs removed at autopsy of 28 patients dying in the Cook County Hospital of systemic infection following miscarriage or abortion. It covers the period between May, 1920, and January, 1922, and is part of a study of the pathogenesis and pathologic anatomy of sepsis resulting from miscarriage or abortion, spontaneous or criminally induced. Rather extensive study has been made of the bacteriology of puerperal sepsis but it is only during the past ten or twelve years that much attention has been paid to the bacteria found in patients with evidence of systemic infection following miscarriage or abortion, and nearly all such investigations have been of the relation of the bacteria found to the prognosis and treatment rather than to the pathologic anatomy.

Schottmüller,[1] in 1920, made a study of the cervical flora of 100 cases of septic abortion and isolated in largest numbers such organisms as S. erysipelatus, staphylococcus, B. coli and pneumococcus. Winter[2] the following year reported similar results, determining the course of treatment by the bacteria isolated. Numerous papers continued this discussion concerning the bacteriology and treatment and it seems that the majority of investigators were unable to correlate the clinical course with the bacteria found in the cervical secretions. It does appear, however, that the hemolytic streptococcus is not commonly present in the cervical or uterine secretions and also that when systemic infection following abortion or miscarriage due to this organism occurs, the course is shorter and the mortality higher. Traugott[3] includes in his study of the bacteria of the lochia in septic abortion, the results in six deaths. Streptococcus longus was isolated three times, B. coli and a diplostreptococcus twice, and staphylococcus albus and a diplostreptococcus once. Thrombophlebitis, infarction and endo- or parametritis were found in those instances in which S. longus was the predominating organism; with infections due to colon bacilli and staphylococcus there was more suppuration: pelvic peritonitis, purulent parametritis and peritonitis, being noted. Warnekros[4] in seven deaths from sepsis following abortion found streptococci in the peritoneal fluid or heart blood in nearly every instance, though, in

three there was a mixed infection. Thrombophlebitis was present in three, and S. longus isolated each time. In ten cases there was one with peritonitis, four with peritonitis and sepsis, five with sepsis and pyemia. Hemolytic streptococci were found in the peritoneal fluid four times and staphylococcus once. Warnekros found that the organisms isolated from the blood were often different from those in the lochia.

Material for culture was collected by Dr. E. R. LeCount at the postmortem examination of patients dead from sepsis following miscarriage or abortion, 28 cases in all. In nearly all, cultures of the blood from the heart, of peritoneal, pleural, pericardial and cerebrospinal fluids, splenic pulp and uterine contents were made; and in all, stained direct smears were made. Blood agar plates for aërobic and anaërobic bacteria were made, and dextrose broth was also inoculated.

Hemolytic streptococci were isolated as the predominating organism in thirteen instances; B. coli in four, staphylococcus in four, pneumococcus in three, B. proteus in two, B. mucosus once, and alpha streptococci once. Mixed infections were encountered in various fluids, but the bacteria mentioned were found in each case in several of the materials examined.

Blood from the heart was cultured 27 times with positive results in 22 instances; hemolytic streptococci 17 times, B. coli and staphylococcus four each, pneumococcus, proteus, pyocyaneous and alpha streptococcus each once.

Cultures of fluid from the peritoneal cavity remained sterile in five of 21 instances. Beta streptococcus was isolated in eight instances, pneumococcus, B. coli, staphylococcus each twice, alpha streptococcus and B. mucosus each once.

It is of interest to note that twice, large numbers of gram-positive cocci were seen in cover glass preparations of peritoneal fluid but repeated cultures in solid and fluid mediums failed to yield any such organisms.

Six of 23 cultures of spinal fluid remained sterile. Beta streptococcus was isolated in five instances; staphylococcus in six; pneumococcus and B. coli twice; pyocyaneous and B. mucosus each once.

Fluid from the pleural cavities was cultured in 20 instances, yielding beta streptococcus ten times; B. coli and staphylococcus each three; pneumococcus twice; proteus and alpha streptococcus once.

From 20 cultures of the spleen, nine remained sterile; five contained beta streptococcus; two B. coli; pneumococcus, staphylococcus, proteus, and alpha streptococcus each once.

Material from the cavity of the uterus was used for cultures in 14 instances; from two nothing grew, six contained beta streptococcus,

two each B. coli and staphylococcus; proteus and alpha streptococcus each once.

Although in many cases more than one organism was recovered from the material, from the majority some one type of bacteria was found in several of the fluids examined. Summarizing the results of the 28 cases, there were 24 in which some one organism appeared in several of the fluids from that body; thus beta streptococci were isolated from more than one place in 13, pneumococcus, B. coli and staphylococcus in three each, B. mucosus and alpha streptococcus each in one. Cultures during life were made from the blood of five patients. In only one were any organisms found; these were beta streptococci and in this case there was thrombo-ulcerative endocarditis. The hemolytic streptococci isolated in all instances proved to be of the beta type; all fermented lactose and salicin but not mannite or inulin and efforts to determine any specific strain by agglutination tests failed. Agglutination of suspensions of these strains by serum from rabbits injected with strains of hemolytic streptococcus from several sources such as scarlet fever, erysipelas and infected tonsils as well as post-abortion sepsis failed to show any specific characteristic group.

Although it was noted at the postmortem that the alterations were, as a rule, peritonitis or thrombophlebitis of varying locations, degrees and sequences—also that these two sorts of alterations were rarely combined—a difference in the bacteriology to correspond to the two types of alterations was not definitely established.

Naturally enough, statements, particularly in the negative, by the patients who have suffered criminal or self-induced abortion, are entirely unreliable. Admissions were obtained from 13 patients that pregnancy was interrupted by midwife, physician, or the patient herself. In four patients, hemolytic streptococci were found; in seven staphylococcus or B. coli; and pneumococcus and proteus each once. In three of the four cases in which beta streptococci were found, it was stated that a physician or midwife had introduced rubber balloons or performed curettage. In the fourth, the patient stated that she had inserted a slippery elm stick, but it was later found that the uterus was perforated. Patients with sepsis associated with such organisms as B. coli or staphylococci or B. proteus were apparently treated under conditions far from aseptic and with repeated introductions of instruments into the uterus.

One patient aborted four days before entrance to the hospital and lived only two days after admission. At the necropsy, gangrenous endometritis and acute serofibrinous peritonitis were found, also bilateral pleuritis and pyosalpinx. In the blood from the heart, peritoneal, pericardial, pleural and cerebrospinal fluids there was a pure culture of hemolytic streptococci.

Two patients denied any instrumentation of the uterus but stated that they had taken pills and used repeated douches to terminate pregnancy. Both were ill about three weeks with cramps, chills and fever. At the necropsy, gangrenous endometritis, fibrinopurulent peritonitis and perimetritis were found. In one instance there was in addition suppurative thrombophlebitis of the right iliac vein, with infarcts in the spleen and in one lung. Cultures of the blood, pleural and peritoneal fluids contained beta streptococci.

Another patient had been attended by a midwife and doctor on a number of occasions, later developing chills, fever, sweats and swelling of the left leg, with beginning gangrene. After death a purulent endometritis with an abscess in the myometrium was found, with thrombosis of the uterine, ovarian, renal, iliac, and femoral veins and inferior vena cava. Staphylococci and B. coli were isolated from the blood in the heart and the inferior vena cava. No organisms were isolated from the peritoneal fluid.

SUMMARY

From this study of the bacteria found in women dying from sepsis following abortion, it appears that the hemolytic streptococcus is more often found than other organisms, but that such bacteria as B. coli and staphylococci are not infrequently present. It is possible that the hemolytic streptococci are present in the lochia but it appears that some outside influence such as trauma from instrumentation, douches, and the like are necessary to bring about generalized infection.

REFERENCES

(1) München. med. Wchnschr., 1910, lvii, 1817. (2) Zentralbl. f. Gynäk., 1911, xxxv, 569. (3) Ztschr. f. Geburtsh. u. Gynäk., 1911, lxviii, 328. (4) Arch f. Gynäk., 1912, xcviii, 600.

Cook County Hospital.

REPEATED DYSTOCIA FROM FETAL ANOMALY IN SUCCESSIVE PREGNANCIES

By A. L. McDonald, M.D., Duluth, Minn.

THE following experience with-complete *situs transversus* accompanied by polydactylism, tremendous fetal ascites and extensive anomaly of the bladder, is most unusual. Instances of *situs transversus* are not infrequent and if uncomplicated are not incompatible with life and normal growth. Repetition of almost the exact condition in the succeeding pregnancy is sufficiently unique to justify a report.

Mrs. O. F. C., age twenty-eight years. Family history: no deformity or abnormality in mother or husband, or in grandparents and families for two generations. Past history negative. Menstruation began at 14 years of age, regular 28 day type. Mother had had two pregnancies both of which resulted in premature labor. One of these babies lived but a few hours and the other was stillborn. Mother is sure that there was no external deformity of either of these babies. There is no history of previous infection or acute disease of the mother. Negative Wassermann tests had been obtained for mother and father one year previously.

CASE 1.—Last menstruation May 20, 1918. The pregnancy was normal and uneventful until December 18, 1918. Patient was of normal build. General examination entirely negative. Pelvic measurements: spines 24 cm., crests 28 cm., trochanters 32 cm., external cong. 20 cm. Diagonal not reached.

Labor began at 6 P. M., December 18, 1918. Examination at 11 P. M. of that date. Abdomen was greatly distended, fetal parts could not be palpated, fetal heart heard to the right of the umbilicus. Head was not demonstrated in the fundus and diagnosis of head presentation was assumed. At 3 A. M. dilatation of cervix was nearly complete and a small part was felt protruding into the vagina. Under full anesthesia the small part was identified as a foot which was clubbed, and on which there were six (6) toes. It was apparent that we were dealing with some type of fetal anomaly. Dilatation of the cervix was completed manually, and a hand introduced into the cavity of the uterus. One could feel what was apparently a second set of membranes which were thickened but presented marked fluctuation. It was impossible to extract the fetus by traction on the foot, and careful examination demonstrated, that what was at first taken for a second bag of waters was, in reality, the tremendously distended abdomen of the fetus. A thinner area in the abdominal wall was located and the operator's finger was forced into the abdomen. A tremendous amount of clear ascitic fluid was expelled. This was not measured, but a conservative estimate would be several quarts. Extraction of the rather small fetus was then comparatively easy. Convalescence of the mother was uninterrupted. There was practically no amniotic fluid.

The baby was stillborn and its length 15 inches, the head was small and of the hydrocephalic type, thorax well formed, abdomen had been apparently immensely distended, walls thin. The lower part of the abdominal cavity and pelvis had been somewhat mutilated in the extraction, also the external genitals so that it was impossible to determine the sex of the baby. The extremities were well formed except as follows: the feet were both clubbed and on each foot six toes could be

demonstrated, the hands were normal except that there were six digits entirely formed and one of these, on each hand, was double (fused).

The liver of normal size located in the left hypochondrium, with gall bladder and ducts extending from the left side to the duodenum. Stomach, spleen and pancreas on the right side. Cecum and appendix were on the left side, only partly descended. Small and large intestines apparently normal in structure. Sigmoid and rectum to the right. In the lower abdomen there was a large mass extending from the symphysis to the umbilicus. Kidneys were of normal size and position, the ureters were enlarged and entered the mass described above. This was opened and proved to be a bladder with thickened walls. The cavity could be followed above the umbilicus, where there was a large patent urachus. On each side of the mass small structures, which were apparently the ovary and tube, were found on each side. No uterus could be demonstrated. Examination of the thorax demonstrated the heart on the right side and situs transversus apparently complete. The placenta was normal in gross structure. Section showed villi to be normal or only slightly thickened.

CASE 2.—Same mother. Last known menstruation August 20, 1920. Wassermanns: father's negative, mother's 1 plus. Mother received 3 doses of salvarsan and 10 injections of mercury. Wassermann negative. November 19, bleeding and pains, no mass or clots. Felt life in February or March. Examinations failed to demonstrate fetal motion until April or early May. Fetal heart heard in May. Fundus never extended more than two fingers above umbilicus. Duration from size seemed not more than seven months.

Labor, July 23, first stage 4 A. M., six to eight weeks beyond the expected date. Examination 5 A. M. Head engaged, occiput anterior, LOA. Fetal heart heard to left of umbilicus good. Vaginal examination: cervical dilatation ⅓. Nine A. M. fetal heart good, full dilatation. Membranes ruptured, no fluid, presenting part difficult to determine, delivery with head extended, brow presentation with the face anterior. Fetus alive but died with only a few gasps, failure of heart beat.

Examination of fetus: 16 inches from head to feet. Head fairly well formed, considerable molding, prominent frontal region, tongue split, good growth of hair. Nails not formed except at base. Thorax small but well formed. Abdomen distended with fluid. Spine and pelvis apparently normal. Extremities: uppers normal except hands. Right has seven fingers with nails, left has six. Lowers normal except feet which are clubbed, right and left with six toes each. Abdomen distended with clear fluid, about six ounces, much less than preceding case. Organs show complete *situs transversus* as follows: the liver is on the left side about normal size. Gall bladder in normal relation to liver, ducts demonstrated, common duct extends through pancreas where it receives the pancreatic duct and enters the duodenum. The pancreas extends across behind the stomach to the right. The spleen, under the right costal margin, is about three inches long and two wide. The large intestine can be followed up from the rectum with a long sigmoid flexure on the right with the descending colon attached on the right. Transverse colon in normal position, cecum and appendix on left side, descent not quite complete. The small intestine varies in size but contains bile-stained meconium. A short great omentum can be demonstrated in front of the transverse colon. Fusion is not complete as a sound can be passed through the foramen of Winslow between the layers of the great omentum. The lower abdomen is filled with a fluctuating thick walled sac which contains about six ounces of clear fluid apparently urine. Attached to one side is a small mass with a definite blood supply, later section taken to be a structure of a testicle. Opening the sac one finds a large cavity which can be followed up to the umbilicus to a patent urachus, the walls are from one-fourth to one-half inch thick. On the right side a greatly distended and tortuous ureter can

be followed to a rather small kidney which is normally located with a normal blood supply. The adrenal appears normal. A similar condition was found on the other side. The urethra can be demonstrated opening into the bladder between the ureteral openings. The external genitals are those of a male with undescended testicles. The placenta is of normal size and gross appearance.

These cases present four types of anomaly: 1st, polydactylism and syndactylism; 2nd, *situs transversus;* 3rd, some anomaly of the urinary tract with hypertrophy of the bladder wall and patent urachus: 4th, ascites. Considerations as to causal factors are purely speculative. The available literature does not give sufficient information or even suggestion to warrant detailed discussion. It is conceivable that anomalies associated with the transposition of viscera might cause the development of urethral obstruction. This in turn might explain the hypertrophy of the bladder wall, patent urachus and ureteral dilatation. I am aware of no known relationship which would explain the association of ascites, which was found in each of these cases. Polydactylism and syndactylism are known to be transmitted and are claimed to follow Mendel's Law. (J. S. Manson.[1]) This condition is easy to trace in families since it cannot be concealed and is usually observed by relatives. This author traces a Welch family through four generations. The paternal ancestor had webbing of the third and fourth fingers of each hand and six toes on each foot. His wife was normal. Sixty-four descendants are traced, of whom 27 were affected, and 33 normal, and four unknown. In most instances the affection persisted nearly true to type. It was carried through into the fifth generation, always through affected parents. There was no instance of skipping through unaffected parents. It was carried through either male or female parents. In our instance both mother and father were normal, as were their brothers and sisters. Neither mother nor father had heard of such anomaly occurring in their parents' families or among their grandparents. These two cases must be regarded as accidental or at least independent of direct hereditary influence.

The conclusions of Mall,[2, 3] based on an intensive study of a large number of pathological ova and embryos, are most interesting and have a direct bearing on the subject. The following statements are formulated from his articles. Spontaneous abortion occurs in at least 20 per cent of all pregnancies. Of all abortions, from 40 to 60 per cent are associated with pathological ova or fetuses. The abnormalities are produced during the first two months of pregnancy before development of the placenta is complete. Of such pathological ova, only one in twelve can be carried to full term and this results in a monster with varying degrees of abnormality. In tubal pregnancy the frequency of pathological ova runs as high as 96 per cent, and of

the ectopic pregnancies which persist to a period of viability, the percentage of abnormality is about as great. There is some reason to believe that a threatened spontaneous abortion during the first two months of pregnancy is evidence of a pathologic ovum which if carried to full term would result in some type of a monster. Mall is convinced that such pathologic conditions develop in normal ova from normal germ and sperm cells, due to abnormal implantation of the ovum in a defective or abnormal decidua. Corner[4] brings out the fact that abnormalities may develop in the mammalian ovum before implantation takes place. Mall in his articles describes ''dissociation'' of tissues, which results from disturbance in nutrition during early embryonic life, in a most interesting manner. That is, growth and development of certain tissues in certain regions are delayed at a critical period while other tissues grow, disproportionately, and the normal relationship is lost. The result is some degree of abnormality, which may be sufficient to destroy the fetus and bring on an abortion, or may be so slight that fetal development goes on to full term, resulting in some type of monster. There is a marked tendency for the same mother to produce pathologic ova or fetuses in repeated pregnancies. Pathologic ova are commonly believed to be due to abnormal conditions in the endometrium, but these are not properly associated with monsters, or abnormalities present at birth.

REFERENCES

(1) Jour. of Genetics, 1915-16, v. 51.   (2) *Mall, F. P.:* Pathology of the Human Ovum. *Keibel and Mall:* Human Embryology, J. B. Lippincott Co. (3) *Mall, Franklin P.:* Am. Jour. Anatomy, 1917, xxii, No. 1.   (4) *Corner, George W.:* Contributions to Embryology, No. 60. Publication No. 276 of the Carnegie Institution of Washington.

These specimens have been placed in the Anatomical Museum at the University of Minnesota, where they are available for study.

"ONCE A CESAREAN SECTION, ALWAYS A CESAREAN SECTION," AN UNTRUTH

By J. P. Greenhill, B.S., M.D., Chicago, Ill.

From the Chicago Lying-In Hospital and Dispensary

F OR the sake of statistical information, I should like to place on record very brief case reports of three patients delivered during the past year at the Chicago Lying-in Hospital, *per vias naturales*, who had in previous labors been delivered by cesarean section.

CASE REPORTS

CASE 1.—Mrs. E. M., No. 10754, a primipara aged twenty, was admitted to The Chicago Lying-In Hospital, in labor, Feb. 17, 1920. The general examination was negative and the pelvis showed the following measurements: Intersp. 22, Intercr. 25, Intertroch. 29, Baudeloque 18, and Conj. Diag. 11½. The antenatal record mentioned that there was a false promontory, that the lateral sacral curve was convex and that there were exostoses on the sacrum. The child was in O. L. P., the fetal heart tones were regular, the cervix was dilated 3 cm. and the head was not engaged. After twenty hours of strong pains with very little progress, a laparotrachelotomy (low cervical cesarean section) was performed, and a child weighing 3,231 gm. (7 lb. 2 oz.) was delivered. The convalescence was entirely uneventful and the patient left the hospital on the twelfth day after operation.

On May 28, 1921, this patient (No. 17376) returned to the hospital again in labor. It was decided to give her a test of labor under strict supervision. Labor progressed uneventfully and after 14½ hours there was complete dilatation and the head was on the perineum. Prophylactic forceps were applied to save the patient the strain of the second stage and a live child weighing 3,355 gm. (7 lb. 6 oz.) was delievered. After delivery the uterine cavity was carefully examined for evidences of the cesarean section scar but no trace was found. The patient made an excellent recovery and went home on the eleventh day postpartum.

CASE 2.—Mrs. G. P., No. 22417, a secundipara, was admitted in labor to The Chicago Lying-In Hospital, April 30, 1922. She had had a classic cesarean section performed in August, 1920, in a local hospital, after having been in labor for twenty-four hours. The indication for the operation, according to the patient, was malposition of the baby. The latter weighed 3,855 gm. (8½ lb.). At the end of fourteen days the patient left the hospital.

At the time of the present admission, the general examination was negative. The pelvic measurements were normal, the cervix was dilated 4 cm. and the head was floating. After a labor lasting more than thirty-five hours, during most of which time the pains were strong, a baby weighing 4,025 gm. (8 lb. 14 oz.) was delivered spontaneously. No intrauterine examination was made. The puerperium was uneventful and the patient left the hospital on the tenth day.

CASE 3.—Mrs. F. S., No. 11666, a primipara aged twenty-four, was admitted to The Chicago Lying-In Hospital on April 19, 1920, because she had a profuse hemorrhage from the uterus. On admission the general examination was negative. The external measurements of the pelvis were as follows: Intersp. 25, Intercr. 29, In-

tertroch. 29, Baudeloque 20. The patient was at term but the head was floating. The position was O. L. P. and the fetal heart tones were regular. Vaginal examination revealed the cervix to be dilated 2 cm. and a portion of the placenta was found covering the cervical orifice. Pains began soon after admission and continued but with irregularity for thirty-eight hours. During this period there was slight bleeding. Because of this and because the head still remained above the pelvic brim, a classic cesarean section was performed. A live baby weighing 2,860 gm. (6 lb. 5 oz.) was delivered. The patient made an uneventful recovery and was discharged on the twelfth day.

On Feb. 23, 1922, the patient returned to the prenatal clinic, pregnant 26 weeks. She was advised to enter the hospital on June 2, ten days before the expected date of confinement in order to be watched. On June 9, at 2 A. M., labor began. It was decided to deliver the patient through the vagina if possible. Exactly five hours after the onset of labor, there was complete dilatation and the head was engaged. It was decided to eliminate the bearing-down pains of the second stage by applying forceps; but 20 minutes after dilatation was complete, the patient delivered spontaneously a live baby weighing 2,975 gm. (6 lb. 9 oz.). The uterus was then felt abdominally and the scar of the cesarean section was distinctly palpable. The placenta was delivered by the Schultze mechanism, by early expression, that is, by pressure on the fundus uteri after the placenta had separated and was lying in the vagina. There was no bleeding from the vagina, but examination of the placenta revealed the fact that a portion was missing. The hand was inserted into the uterus and the missing piece of placenta was found attached to the uterine scar. This piece of placenta was gently removed and the scar palpated. The thickness of the scar for most of the distance was approximately 1 cm. but in one portion it was not more than 0.5 cm. in thickness. Pituitrin and ergot were given, the former after the delivery of the baby and the latter after the expulsion of the placenta. The patient made an uneventful recovery and went home on the tenth day.

CASE 4.—Mrs. M. B., No. 24698, aged twenty-six, a tertipara, with normal pelvic measurements was delivered April 17, 1920, by a classic cesarean section in an army hospital. The baby weighed 3430 gm. (7 lb. 9oz.) and the indication for the operation was a breech presentation. Recovery was uneventful. On July 3, 1921, the patient again went into labor. She had very strong pains and according to the husband, the child's head was visible for a number of hours. Despite this, the attending physician refused to apply forceps and the patient delivered the baby spontaneously after 15 hours of hard labor. This child weighed 3628 gm. (8 lb.). For her third delivery (Sept. 21, 1922, the patient came to Dr. DeLee. She gave a history of abdominal pain suggestive of adhesions and on abdominal examination definite bands could be felt connecting the uterus with the abdominal wall. Furthermore the uterine scar was easily felt and this was considerably depressed for a distance of about 6 cm. Because of these findings and because the patient feared further pregnancies, it was decided to perform a classic cesarean section. On opening the peritoneal cavity thick connective tissue bands were found stretching from the uterus to the abdominal wall. The uterus was rotated so markedly to the left that the right cornua was located in the midline. The bands were ligated and cut, thereby releasing the tortion of the uterus. A low fundal incision was made and a live child weighing 3600 gm. (7 lb. 15 oz.) was delivered. The old scar was found to be very thin, as abdominal examination had revealed. After suturing the uterine incision, wedges from the uterine cornua were removed, the raw edges covered with peritoneum and the proximal ends of the fallopian tubes buried in the folds of the broad ligaments. The patient made an excellent recovery and went home on the fourteenth day.

COMMENT

It will be noted that in all four cases, the babies born through the vaginal route, weighed more than the children delivered by cesarean section. One patient was delivered by forceps (prophylactic) and three gave birth spontaneously. In three cases the uterine cavity was explored. In the cases where the classic cesarean section had been done, a relatively thin scar was found, whereas in the patient on whom the low cervical operation had been performed, no trace of a scar was palpable. In the three cesarean sections performed at the Chicago Lying-in Hospital catgut only was used in closing the uterus.

It appears from this report that the dictum, ''Once a cesarean section, always a cesarean section,'' is untenable in the light of the modern way of performing cesarean section.

426 EAST FIFTY-FIRST STREET.

Society Transactions

DR. ONSLOW A. GORDON, JR., reported a case with marked **Cystic Changes in Uterine Myomata.**

This case occurred on the Gynecological Service of Bellevue Hospital and seemed of special interest because of its well-developed cystic type and the symptomatic and gross resemblance to an ovarian cystoma.

The patient was single, forty-four years of age, her menstruation showed no ab-
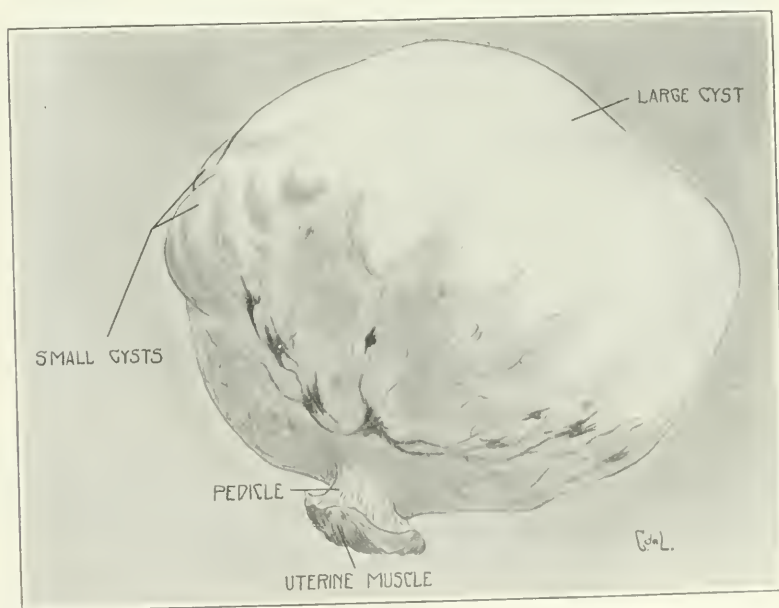
Fig. 1.

normality, occurring every twenty-eight days and lasting three days. She had never been pregnant. She had noticed an almost continual "soreness in the abdomen" for about two years; three days prior to her admission to the hospital the pain suddenly became severe and she was unable to walk. There were no gastro-intestinal symptoms.

Abdominal examination disclosed a plainly palpable tumor mass, occupying the central portion of the lower abdomen extending almost to the umbilicus and measur-

ing about 15 cm. in diameter. The mass was regular in outline, apparently cystic and not tender.

Vaginal examination showed a normal sized uterus anterior to the cystic mass described. There were no other palpable abnormalities. A tentative diagnosis of ovarian cyst or fibromyoma was made and a laparotomy advised.

When the abdomen was opened a glistening grayish colored cystic mass presented which was thought, because of its gross appearance to be an ovarian cyst. It was found, however, to arise from the fundus of the uterus just posterior to the right fallopian tube. It had, as shown in Figs. 1 and 2, a definite pedicle, which was excised.

The specimen consisted of a rounded mass measuring 15 x 15 x about 10 cm. At one pole of the mass was a small oval nodule, measuring 2 cm. in length. This nodule is composed of tissue which has all the naked eye characteristics of well-
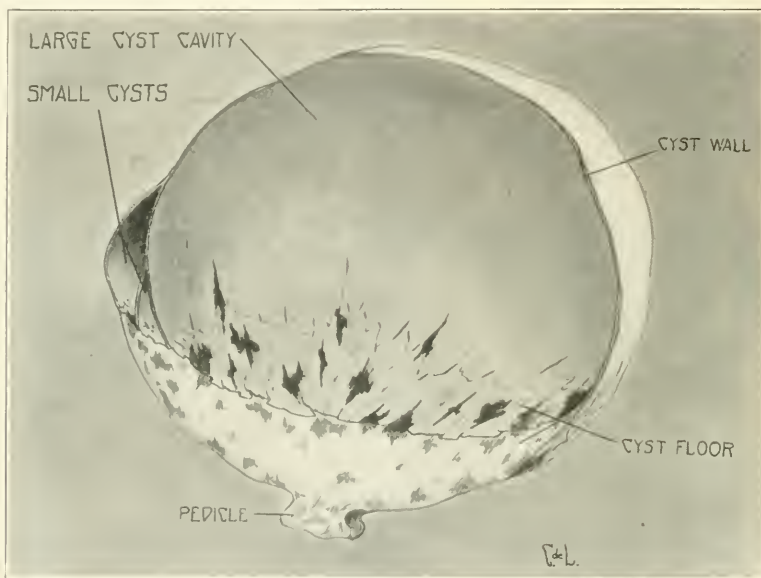
Fig. 2.

preserved uterine muscle. From this nodular pedicle a large, thick, fan-shaped mass of tissue ran off circumferentially for a distance of about 8 cm., when it suddenly became replaced by a thin rim of smooth, tough, glistening fibrous tissue, puncture of which released about 300 c.c. of thin, clear fluid.

Microscopic examination of the wall of the cyst at the point of junction with the remnants of muscle tissue shows the presence of an external layer of fibrous connective tissue, constituting the wall of the cyst-like formation. Internal to this are remnants of relatively well-preserved uterine muscle fibers, together with patches of granulation tissue, mature fibrous tissue, and variable quantities of fibrinoid material of indefinite structure.

Transudation changes, of which this cystic fibromyoma is a type, occur as a rule in well-pedunculated subserous growths permitting a moderate circulatory interference especially with the return blood supply. Areas of hyaline degeneration are formed which gradually undergo liquefaction and small cyst spaces thus develop. Such spaces have, of course, neither an epithelial nor an endothelial lining. As

these spaces enlarge the trabeculae separating neighboring spaces rupture and thus larger spaces are formed. Enormous cystic myomata may thus develop; Lihotsky reports a case in which the cyst contained 34 liters; Cullen reports a cystic myoma weighing 89 pounds. The fluid content of these cysts is usually straw-colored and if hyalinization has preceded the cyst formation it will coagulate upon exposure to the air.

DR. JOHN H. TELFAIR reported three cases of **Separation of the Symphysis Pubis during Labor.**

At a meeting of this Society in January, 1916, Morgan reported four cases of ruptured pelvis. His analysis of statistics at that time indicated that this accident occurred once in 25,000 cases. The three cases about to be described were admitted to the Obstetrical Division of Fordham Hospital during the past eleven months.

CASE 1.—Anna H., age twenty-six, para i. Family and previous personal history negative. Admitted December 19, 1921, at term, all pelvic measurements normal; presentation and position, vertex, L. O. A. First stage 62 hours, second stage 1½ hours, terminated by a high forceps delivery. During the extraction, when the head was in midpelvis, the operator felt a sudden ''give'' after which the extraction was easy. Baby weighed 4560 grams. There was profuse bleeding from the anterior vaginal wall and upon examination it was found that the entire anterior vaginal wall, urethra and labia were separated from the ramus pubi on the left side. After introducing a catheter into the meatus, clear urine was obtained indicating no injury to bladder. There was a separation of the pubic bones of about 3 cm. Retention catheter inserted and lacerations repaired. Six inch adhesive plaster strap was applied over the trochanters and completely surrounding the pelvis. Shock was moderate, patient responded well. Two days postpartum patient developed a profuse, purulent discharge coming from the space of Retzius. Sacroiliac joints showed no disturbance. Patient ran a mild septic convalescence. Fibrous union developed at the symphysis and the patient was discharged from the hospital in four weeks, walking without difficulty.

CASE 2.—Clementine L., age twenty-six, para iv. Admitted May 28, 1922. Had had three full-term normal deliveries. Patient at term, weighed 95 pounds, normal pelvic measurements, presentation vertex; position, L. O. A. Labor progressed rapidly with strong pains. After delivery patient showed moderate shock. Baby weighed 5280 grams. Separation of the symphysis was suspected after examination and this was confirmed by x-ray. There were no lacerations. The usual adhesive straps were applied and the patient made an uneventful recovery, leaving the hospital on the sixteenth day, walking without difficulty.

CASE 3.—Josephine N., age twenty-four, para i. Admitted June 12, 1922, having just been delivered at home by forceps. Baby weighed 4560 grams. Came in still under the influence of ether, with vagina packed to control hemorrhage. Moderate shock present, pulse 136. On June 13, packing was removed, when it was found that the anterior vaginal wall and urethra were torn from the pubic bones, the laceration extending into the prevesical space. The pubic joint was ruptured and the ends of the bones separated 10 cm. Permanent catheter was introduced and the oozing wound was packed to control hemorrhage. The pelvis was strapped in the usual manner and the pubic bones brought into apposition.

Next day temperature was 103° and pulse 140, with pain and tenderness in lower

abdomen and worked distention. Patient ran a severe septic course for three weeks and left the hospital at the end of five weeks walking without pain or difficulty.

DISCUSSION

DR. F. A. DORMAN.—In my experience this condition is a rare one. Possibly a certain number of women must come to us in a condition that makes it very easy for the symphysis to rupture. I have in mind this moment a patient who had premature twins. There was practically no difficulty in delivery or in extraction and yet there was separation of the symphysis and a lot of pain postpartum. There was no history of a movable symphysis before term. Some patients develop a movable symphysis during pregnancy which is capable of a certain amount of separation but will tighten up after delivery. A very interesting case of that sort came to my hands years ago when I was in the Post-Graduate Dispensary. This particular patient limped into the examining room, exceedingly crippled. It was her third pregnancy. She said that every time she became pregnant the symphysis softened and as soon as the baby was delivered and she had rested for a time everything tightened up. We must have graduations of that sort in this condition, and a certain number of our cases, even with a slight amount of trauma, will, I believe separate. I would like to ask the doctor whether there was sacroiliac pain in his cases?

DR. J. O. POLAK.—These separations are not so infrequent in the emergency services. I have only seen four, but three of the four occurred with spontaneous labor, and the fourth one occurred from just such an incidence as Dr. Telfair reported, where high forceps were used.

Fortunately, in Brooklyn, we have been able to teach that forceps are not to be applied on floating heads, and so in the last five or ten years I have not seen any separations of the symphysis. A remarkable instance was that of a case in the service of Dr. Beach where the patient had a separation, prior to delivery, of five or six centimeters, but was able to walk without difficulty. The separation increased during delivery, but she was up in the usual time. The separation still exists.

DR. A. H. MORSE.—We had last year a case similar to one of those Dr. Telfair described, a patient who had been delivered outside the hospital. We were unable to get an accurate history, but there had been, at any rate, a forceps delivery and she was sent into the hospital in shock and with a separation of the symphysis so that one could introduce three fingers. There were also in that case two lacerations in the bladder. We strapped her in much the same way that Dr. Telfair described and followed the case up with the result that after having x-ray pictures taken we found that there was a definite injury at the symphysis. She could get about, but she passed out of our hands and later we discovered that she was operated on, but without success.

I have seen one other case in which forceps was attempted in a moderately contracted pelvis in a colored woman and during the traction the symphysis separated.

DR. O. P. HUMPSTONE.—I would like to refer to postpartum separation of the symphysis. I had never seen this condition before, and it seems to have some points of interest. This woman was brought in profoundly septic from her labor outside the hospital, and there was no separation of her symphysis at that time. She developed a parametritic exudate (extraperitoneal) pointing towards Poupart's ligament on the right side and ultimately opening in the left labium. In two or three days, however, there was a swelling in the right labium. A small incision permitted the discharge of about a quart of pus. Incising and exploring

up along this tract, we found that the patient's symphysis was gone and that the cartilage had been entirely destroyed by this septic process, but ultimately she made a perfectly good recovery and was able to walk.

DR. TELFAIR, closing.—In answer to Dr. Dorman's question as to whether there were any symptoms or evidence of sacroiliac pain or separation, I might say that the plates of the last case I described showed a considerable separation of the sacroiliac joint on each side; but none of these patients had any pain as a result of sacroiliac separation.

I might say, incidentally, that it is a very difficult matter to actually hold these cases of separation in apposition; in fact, one, I think, should be careful not to seek complete apposition on account of the great danger of squeezing the urethra, the anterior vaginal wall and the base of the bladder between the ends of the bones.

When case No. 3 left the hospital, I had the opportunity of examining her in the standing position, shifting the weight of the body from one foot to the other, and fibrous union was so perfectly developed that one could easily notice the sides of the pelvis rock up and down; it was a very satisfactory joint and the patient had no pain when walking.

DR. ROBERT T. FRANK (by invitation) presented a paper entitled **Treatment of Cystocele, Rectocele, and Uterine Prolapse.** (For original article see page 8.)

DISCUSSION

DR. L. G. BALDWIN.—Insofar as operations for repair during a woman's childbearing period are concerned, there are very few cases that cannot be made comfortable, and I think by all means they should be done. By the use of pessaries or the use of the cautery in healing erosions, stopping discharge, and doing away with sepsis, women can be made perfectly comfortable.

I think there is nothing more outrageous than the present-day operations on the cervix and perineum after every childbirth.

DR. H. N. VINEBERG.—Dr. Frank has given us a very lucid description of original work, especially insofar as the amount of cellular tissue surrounding the cervix is concerned and the importance of conserving it. I have tried in these cases, where there is a prolapse and the uterus is enlarged, to amputate the body of the uterus and keep the cervix and cellular tissue around it and use it as a prop for the bladder and for the anterior portion of the pelvic floor. I would like to ask whether there is any advantage in separating the vaginal mucosa from the fascia? Cannot the same result be obtained by simply suturing the two together instead of doing a very difficult separation? I believe you get the same result if you are sure that the vaginal mucosa is denuded far enough out so that the fascia is underneath. The fascia near the pubic arch is very thick and strong and I always suture this separately. The fascia lower down very often is thin and to suture this separately from the vaginal mucosa, in my opinion, is not a wise procedure. I did it in a few instances and I regretted it.

I am also gratified to find that Dr. Frank has found by experience that exposing the levator ani muscles and suturing them together has not been satisfactory. My previous experience in these cases of rectocele was that while I obtained a pretty good lower third of the vagina, some of the rectocele would come over and prolapse on the shelf which was built up below. Now, I simply

carry my denudation higher up, almost to the cervix posteriorly, making a wide straight denudation and pass the sutures so as to embrace the fascia externally, coming out in the opposite side at the point of entrance. The patients are comfortable after this procedure. I wish I could say as much for the cystocoeles as I can for the rectoceles. I seldom have a recurrence of a rectocele, but there are cases where the whole anterior vaginal wall comes down and there is practically no fascia. I do not know what one can do to keep up the bladder completely in those cases.

DR. A. M. JUDD.—I want to add my word of approval to the remark of Dr. Frank that he still uses the Alexander, or the Alexander-Adams operation. It is an operation which I have done for a great many years as an aid in plastic work and it gives me just as much, or better, success than when I first began to use it.

I also want to add my word of commendation of the doctor when ne condemns ventral suspension as a curative measure directed towards the relief of uterine prolapse.

In closing I would like to say that I have been doing the Sims-Emmett-Baldwin operation for the last twelve years and it gives me absolute satisfaction.

DR. H. C. TAYLOR.—I think that everyone who has read Dr. Frank's articles will appreciate the thoroughness with which he has gone into the subject.

Let us consider first women who may have more children. I do not sew up every perineum and every cervix that has been torn, but there is no question that some women in the childbearing age who have lacerations which should be repaired, as otherwise they will get distinctly worse and when they are finally repaired it will be more difficult of accomplishment. So I would be very far from throwing out all cases of women who are going to have more children.

Let us consider next only those women who are beyond the childbearing age. There are five different structures that can be displaced and must be kept in mind for the sake of clearness. They are the urethra, the anterior vaginal wall, the posterior vaginal wall above the perineum, the uterus and the perineum. There may be any one or all, or any combination of these structures in the displacement.

With a displacement of the anterior vaginal wall of any extent the operation I do is the replacement of the bladder to a position corresponding more or less to its original position (it is doubtful that we ever replace it exactly) with a suturing of the anterior wall of the vagina to the anterior surface of the uterus. With a senile uterus and a marked cystocele the bladder is displaced as high as the top of the uterus and we have a true interposition operation. If the uterus is large and the displacement of the anterior vaginal wall is only moderate it is not necessary to displace the bladder so far and the operation is not strictly an interposition operation though the difference is one of degree and not kind.

It is my opinion that the expression "interposition operation" is an unfortunate one as the operation is really replacement of the bladder and is only an interposition operation when the uterus is small and the prolapse marked.

So far as a hysterectomy for prolapse of the uterus or vaginal walls is concerned I rarely do one unless there are other conditions, such as a tumor in the fundus of the uterus, that require the hysterectomy. With a normal uterus a hysterectomy is rarely indicated.

I frequently do a ventrofixation for a prolapse of the uterus in addition to the plastic work on the vagina in women beyond the childbearing age and it has given good satisfaction in my experience. I do not mean a ventrosuspension nor any form of round ligament suspension but a firm fixation of the fundus of the uterus to the abdominal wall.

Regarding the treatment of rectocele, many talk of obliterating the culdesac. I sometimes open the culdesac but I do not obliterate it, nor can I see how the other men do it. I always begin my operation high in rectoceles in women beyond the childbearing age, in practically every case the denudation begins at the cervix. This gives a firmer and more satisfactory support of the pelvic floor.

DR. DOUGAL BISSELL.—Fifteen years ago I made a practical study of the intraabdominal fascia and its many ramifications, and secured it in its entirety, so that it could be demonstrated as one continuous fascia. The dissection was begun at the upper abdominal diaphragm and followed down to the lower or pelvic diaphragm, including the suprarenal glands, kidneys, ureters and female genital organs. My object was not only to demonstrate the unity of the fascia, but to acquire a better understanding of nature's design in the mechanical supports of the female genital organs. The knowledge acquired in this study convinced me that while these several fascias of the female pelvis were ramifications of a continuous fascial structure, each performed separate or special functions, and that rectocele and cystocele, the result of injury or over stretching, were separate entities.

It is gratifying to know that Dr. Frank has abandoned the technic of levator ani muscle union when repairing the lacerated perineum. I have persistently condemned it as an illogical, unanatomical and unscientific procedure. If the injured perineal body is properly restored, provided the posterior vaginal wall is not injured, the levator ani will approximate and function normally without being attacked surgically. The function of the perineum is limited to the anal region. If an injury exists which results in an abnormal separation of the levator muscles resulting in a protrusion of the posterior vaginal wall, these muscles should not be the tissues directly treated, but the relaxed rectal or musculofascial structure of the posterior vaginal wall, and this structure is connected with the levator muscle in such a manner as to make the muscles approach each other when properly readjusted.

Destruction of the perineum may be partial or complete, without an associated rectocele and *vice versa* an extensive rectocele may exist without an associated injury to the perineum. The anterior barrier of the rectum is not the perineum, but the rectal or musculofascial structure of the posterior vaginal wall. It is the failure to recognize the independent function of these areas that has caused a confusion regarding the etiology and surgical treatment of injuries to the posterior genital tract.

My experience agrees with that of Dr. Howard Taylor with regard to enterocele, to separate a large portion of the peritoneum in Douglas' culdesac and tie off where an enterocele exists, does not obliterate the culdesac. I am in accord with him in the opinion that the culdesac is not, under these circumstances, obliterated as is commonly supposed. My experience with the results of such surgery, per abdomen, by the advocates of this operation, has convinced me that the remedy is worse than the disease.

DR. JOSEPH BRETTAUER.—After all, the various speakers do not differ very materially; it is simply a matter of describing the same tissue by different names. The principle of uniting the torn pelvic fascia is the outstanding feature in the various methods. We have never attempted a direct suture of the torn levator muscle and have seen very unsatisfactory results arising from this procedure. The results of the methods described by Dr. Frank are in the main satisfactory; however, the degree of relaxation and prolapse of the vagnal walls varies so much, that of necessity, the extent of the operation must be adapted to each individual case.

Some operators have not been able to obliterate the Douglas pouch by interfer-

ence from below. In those extreme cases in which we find an enterocele in addition to a pronounced rectocele, we have always divided the operations into two parts; first, the one which closes the Douglas pouch by circular seroserous sutures, and second, an extensive posterior colpoperineorrhaphy.

Surely we all agree with Dr. Frank that we cannot be too emphatic in declaring that women during the childbearing age should not be subjected to indiscriminate operations. Indication for operation should be found only after the most careful consideration.

DR. FRANK (closing).—Insofar as the technic is concerned, I also prefaced my remarks by saying I had no intention of trenching upon the delicate subject of priority. In 1870, 1880 and 1890, the basic principles were understood, but they were not clarified. Dr. Brettauer, when I first came to Mount Sinai Hospital, about 1900, could do very excellent plastic operations, as good as any one of us can do now, but he could not teach me how to do them, and it was for that reason that I went into the anatomical laboratory and worked just along the lines Dr Bissell has indicated, in order to see what supports could be utilized and how I could expose them so as to utilize them. I might say that although we differ in minutiae of technic, I think we are now working along the same line, because we use the fascial structures and are most careful in leaving the muscles unexposed, and only approximate them together with their fascia.

Dr. Vineberg spoke about separating or not separating the vaginal mucosa from the pubocervical fascia. I think it is a distinct advantage to do so, and I always say that the only way to expose the anterior fascial structures correctly is to make an incision to only a very slight depth, and then use blunt dissection. It is a bloodless operation and you expose the fascial structures well. You can reach out as far as the parametrium in some cases.

As far as exposing the levator ani muscle is concerned, I assure you that in many of the operations that I have witnessed it is not that muscle that is exposed but the deep perineus muscle. Again and again I have seen the perineus profundus pointed out as the levator.

I did not speak of ventral suspension at all, because I think it is not a good operation; but I agree fully with Dr. Taylor that, after the menopause or after sterilization, there is no better operation than a firm low ventral fixation. The bad results are very few.

As far as Dr. Taylor's modifying the indications that I laid down, I would say that I fully agree that if we watch a case and see a progression of a prolapse, for example, it is time to interfere; but what I take issue, not with Dr. Taylor, however, but with many members of the profession, is in advising the patient at the first visit to have a slight or moderate perineal injury repaired. With that view I am sure he will agree.

As far as lacerations of the cervix are concerned, I believe that only such cases which are apparently causing trouble should be operated upon—the troubles being repeated abortion, and a profuse leucorrheal discharge.

Perhaps Dr. Taylor and I will not be so far apart if I modify my nomenclature and call obliteration of Douglas' culdesac simply a shortening of the culdesac. I do not claim for a moment that you can completely obliterate the culdesac from below. With the Moschcowitz operation you can shorten it appreciably from above and prevent any prolapse of the intestines behind the cervix and the posterior vaginal wall.

Dr. Bissell emphasizes that it is the fascial structures which lend support to the uterus above the anterior and posterior vaginal wall. The vagina as it goes through the levator gap (the genital hiatus or anterior edge of the levators) re-

ceives fascial investments which go up and downward. Beyond the levators it receives additional investment from both layers of the triangular ligament.

I did not go into the minutiae of the anatomy describing how the abdominal fascia also gives investment to the upper portion of the vagina. The muscular portion of the pelvis is simply an additional safeguard which resists sudden stresses and closes up the gap during coughing or expulsive efforts.

I agree with Dr. Brettauer that there are certain cases that cannot be cured permanently by any method, and this certainly applies to rare cases of cystocele where there is no fascia left. In my paper I stated that to be the case. In other words, we are in the same identical position with these cases that we are in in ordinary herniae, whether umbilical, inguinal or other. You may expect 5 to 10 per cent of recurrences. If any one claims he can cure every case of pelvic injury, either uterine prolapse or the associated conditions, I simply say that he is either not a sharp critic of himself or that he does not see his cases after operation.

ST. LOUIS GYNECOLOGICAL SOCIETY

REGULAR MEETING, APRIL 14, 1922

DR. H. S. CROSSEN, IN THE CHAIR

DRS. F. P. MCNALLEY AND W. J. DIECKMANN read a paper on the **Hemorrhagic Lesions of the Placenta and Their Relation to White Infarct Formation.** (For original article see page 55.)

ABSTRACT OF DISCUSSION

DR. MCNALLEY (closing).—Dr. Schmitz's diagnosis of an infarct in his case might fit in very well with Young's idea of infarct formation. The recurring pain in pregnancy in his patient may be caused by small retroplacental hemorrhages and thus an infarct may finally result. If such is the case she should develop a toxemia. It will be interesting to follow her course and examine the placenta after her delivery.

Dr. Gellhorn asks whether every white infarct has its origin in a hemorrhagic lesion. We do not know whether this is so. If Williams' idea is correct, it is not so. We are convinced that some have their origin in red infarcts as described by Young and that some have their origin as hematomata.

We have noticed no particular difference in the size of the villi in toxemic and other cases except in syphilis where, of course, they are much larger.

Young says interference with the maternal circulation will cause circumscribed infarcts because different portions of the placenta are supplied by different vessels and that the whole placental site is not merely a huge lake of blood with free intercommunication of all parts.

One of the explanations that has been advanced for infarct formation is that it is a senile change in the placenta. If this is accepted it will account for the frequency and degree of infarct formation found in those cases that have gone overtime.

In regard to Dr. Ehrenfest's discussion: It is Young's idea that absorption of toxins from infarcts is the cause of the toxemia. The infarcts are the result of interference with maternal circulation, i.e., the changes in the maternal vessels are primary, the cause and not the result of the toxemia.

We agree with Dr. Otto Schwarz that these groups of cells are probably decidual rather than trophoblastic and have noticed their association with white infarct formation. We do not accept his suggestion that the hematomata in the placenta could be accounted for by rupture of a maternal vessel because there are no vessels at the site of these lesions.

In answer to Dr. Taussig's question, we feel that it is possible to differentiate microscopically between a white infarct formed from a red infarct and one formed from a hematoma. In the former the outlines of some villi may be seen, while in the latter these are absent.

We have made no attempt to determine the relation of the weight of all the infarcts to the weight of the entire placenta. There is a specimen in the laboratory that is at least three-fourths infarct.

DRS. O. S. KREBS AND A. P. BRIGGS read a paper entitled **Blood Studies in Normal Pregnancies.** (For original article see page 67.)

ABSTRACT OF DISCUSSION

DR. KREBS (closing).—In answer to Dr. Taussig's question, we might say that the result of chemical studies on the blood of pregnant women, to the present time, have thrown little light on the possible etiology of the toxemias. The nitrogenous elements have been thoroughly investigated, but the inorganic constituents, with a few exceptions, have been neglected. For this reason we undertook a study of the latter in the blood of normal pregnant women, hoping to arrive at normal values for comparison with future work in abnormal cases. Our results have shown the constancy of the inorganic salts in the blood of normally pregnant women, regardless of the period of gestation, except that in the latter weeks the calcium content is slightly diminished.

As Dr. Gellhorn has emphasized and as has been brought out by Caldwell and Lyle, a given blood picture is only of significance together with the clinical findings at the time the blood sample was taken. Dr. Gellhorn suggests that cases should be taken in hand before retinitis develops, to which everyone agrees. But given a pregnant woman with retinitis complicating a toxemia, then the problem arises to determine the amount of kidney damage, especially since the advisability of future pregnancies depends to a considerable extent upon this diagnosis.

Dr. Ehrenfest correctly emphasizes the value of the results of determination of the nitrogenous elements in the blood in relation to the prognosis and advisability of future pregnancies. We feel that the results must be interpreted in terms of renal insufficiency, and, too, that blood studies as have been carried on in the past are of considerable value in the differential diagnosis and prognosis of the various toxemias, but that they throw no light on the exact nature of the toxemia or the probable source of the toxins.

Dr. Royston emphasizes the importance of the estimation of the twenty-four hour urinary output, and a diminution of this as a danger signal. Williams in his text book, speaking of pre-eclamptic toxemia, states that it should be suspected when the patient complains of headache, lassitude and various of the other usual symptoms, but particularly if the urine is diminished in amount and contains albumin.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Midwifery in India*

BY KEDARNATH DAS, M.D., CALCUTTA, INDIA

THE origin of the ancient medical literature of India can be traced to Ayurveda, the date of which is supposed to be about 1500 B.C. The most renowned representatives of this literary monument are the ancient trio—Charaka, Susruta and Bagbhata. Charaka probably lived about the commencement of the Christian era, Susruta during the fifth and Bagbhata, not later than the seventh century, A.D. In tracing the progress of medicine, it is necessary to observe that human nature exhibits a general resemblance among all nations which, however erroneous, must be acknowledged to have some foundation on facts. In spite of the supposed exclusiveness of Egyptian culture, there appears to be an undoubted spasmodic fecundation from Hindustan. It is an interesting fact that the ancient civilized races—Egyptians and Hindus—endowed the art of healing with a supernatural origin and brought a number of deities in close relationship with medicine. Among others, the Egyptians worshiped Bubastis, the goddess with a cat's head as the tutelary deity of procreation and childbirth, while the Hindus worship Sasti, the feline goddess of maternity and the protectress of children, who rides on a cat. The ancient Sanskrit literature, however, enables us not only to trace the development of midwifery in India from its primeval origin in empiricism and theurgy to its height as a fairly completed, though empirical, system of learning, but also to show the determining influence which the East exercised on the trend of medical thought of Greece.

I shall now make a few observations on the salient points on the subject of midwifery, which can be gathered from the writings of ancient Hindu physicians. I might tell you that there was no separate or special treatise on midwifery but scattered references to obstetric subjects could be found in the medical works. Of the ancient trio, Susruta is characterized by a fuller consideration of surgery and difficult labors. It is noteworthy that in their surgical technic, the Hindus were distinguished above all their brethren of the neighboring oriental countries. This superiority was due to their scrupulous cleanliness and the minute attention which they paid to details.

The anatomical descriptions of the pelvis and female organs of gen-

---

eration are far from accurate and often fantastic, drawn from imagination, rather than from observation. The same remark applies to their knowledge of the physiology of reproduction but the clinical observations regarding the age of onset of menstruation, the nubile age and the most favorable time for conception, are worthy of note. The menarche is said to occur at twelve, which I may point out, corresponds to the observations made by me and published in Davidson's *Hygiene and Diseases of Warm Climates,* in 1893. These were undertaken to ascertain the influence of. climate on menstruation. I may also remark, that the practice of early marriage, which was in vogue in Bengal, but which is gradually dying out, was not sanctioned by ancient medical writers but was brought about by social customs. Maternal impression on the fetus is pointedly referred to. The hygiene of menstruation receives adequate treatment.

THE GROWTH AND DEVELOPMENT OF THE EMBRYO

This subject was studied in great detail, but here, too, imagination played a great part. The question of controlling the sex of the child is discussed at great length and detailed directions are given as to the proper time of sexual conjugation, diet, dress and mental conditions, if a male offspring is desired.

The Signs and Symptoms of Pregnancy.— The following only are mentioned: pigmentation of areola of the breast, hypertrichiasis, salivation, sickness and vomiting. In addition to these, weakness and heaviness of eyelids are mentioned. Regarding differential diagnosis of pregnancy, it is pointed out that there is a kind of gulma (tumor) which simulates pregnancy. If after ten months of a supposed pregnancy a child is not delivered, the condition must be considered abnormal and suitable treatment should be adopted.

Hygiene and Management of Pregnancy.—Coitus during pregnancy is interdicted. Rest and quiet with a free and easy life were enjoined. The whims and caprices of the mother should be satisfied; otherwise the child will be born with some defect or deformity. Details of diet in the various months are given.

Duration of Pregnancy.—Nine calendar months seem necessary for the perfection of the fetus; that is 39 weeks or *273 days* from conception. The Hindu sastras allow 10 calendar months or 300 days.

Abortion.—This subject is treated with great detail, especially with reference to its therapy, both preventive and curative. A large number of drugs have been recommended. There is a clear reference to cases of missed abortion, in which exercise is recommended, evidently with a view to expedite the expulsion of the fetus. There is also a mention of the removal of the fruit of conception by the influence of devils. An elaborate list of diets in different months is given so as to prevent abortion. A distinction is made between abortion in the first four months and abortion after that period.

Diseases of Pregnancy—are very meagerly dealt with. A form of nervous disease, complicated with convulsions is described. This is said to have been uniformly fatal, perhaps tetanus.

Diseases and Abnormalities of the Fetus.—The only thing mentioned regarding their causation is the influence of disease in parents.

Abdominal inspection as a diagnostic method during pregnancy was

evidently in use. It is said that twins are known by a depression along the centre of the abdomen.

LABOR

Preparation for Labor.—The description of the lying-in chamber is given very minutely indeed. The directions laid down are undoubtedly rational and hygienic. They show that preventive midwifery made great progress and successfully too. A comparison of the descriptions as given by ancient writers with those of the modern physicians tend to show how custom and usage have rendered the management of labor in some of the Hindu houses of today positively dangerous.

The Fetus in Utero.—With regard to the presentation, position or lie of the fetus, the ancient had absolutely no knowledge. It is merely mentioned that the fetus lies in the uterus bent on itself with its hands and feet flexed.

Physiology of Labor.—Knowledge under this heading was absolutely nil. The explanation of the method of expulsion of the child was grotesque.

Management of Labor.—The signs of the approach of labor are given fairly accurately. During labor, patient lies on her back with high pillows under her head, thighs separated and legs bent. Four old experienced women attend; some directions are given for their guidance, but there is nothing to show that any attention was given to the care of the perineum. It is mentioned that "should the child advance crooked it is to be turned straight by manual assistance." I cannot explain to what it refers. To expedite the expulsion of the placenta, various methods (some disgusting) were adopted to induce vomiting.

Management of Puerperium.—The directions given are far from satisfactory, as they are based on an erroneous conception of the normal physiological course of the puerperium.

Multiple Pregnancy.—Nothing was known as regards its causation beyond the mistaken idea of deranged air.

Delayed Labor.—Drugs for promoting the expulsion of the fetus were not known. Fumigations, charms and sometimes manipulations were employed to expedite delivery.

Preternatural Labor.—There is no attempt at classification, but several conditions which produce dystocia and require artificial aid, are described. Susruta describes eight abnormal presentations, of which one, (both lower extremities), does not require any assistance. five require assistance with the hands alone (some kind of version or extraction) and two instrumental interference (i. e., embryotomy). Destructive operations on a living child are not recommended.

Of other complications, unconsciousness and nervous diseases are referred to, which are said to be always dangerous. Perhaps eclampsia is mentioned. Contraction or any disease of the vagina (? passages), is always considered to produce difficult and dangerous parturition. Death of the fetus in utero connoted great danger to the mother and immediate removal of the child is recommended. Signs of death of the fetus are described: cessation of the child's movements and fetid smell of the breath being mentioned. It is noteworthy that hemorrhage, anteor postpartum is not even touched upon.

Obstetric Operations.—Postmortem cesarean section is mentioned. Perforation of the head, followed by cranioclasm and extraction of the

fetus by hooks is described. Evisceration is recommended for swelling of the fetal abdomen. In impacted breech. division of the pelvic bones is resorted to. The after-treatment of these cases receives careful consideration.

Obstetric Instruments.—Only a few are described but the description of these instruments is neither minute nor precise, as they are not illustrated by drawings nor now employed. In general the name of the instrument was derived from the resemblance to certain leaves, etc. The hand is considered to be the first, the best and the most important of all surgical instruments. As some of the modern physicians have attempted to show that some of them resemble modern obstetric instruments, a few remarks will be made. (1) Mandalagra—this is supposed to resemble a decapitator. It is described as a round or circular headed cutting instrument. Wise, in 1843, gave a diagram which is something like that given by Mukherji after Susruta. Another diagram appears in an English translation of Susruta by K. Bhisagratna in 1907 which has evidently been modified by Mukherji to resemble a decapitator. The description does not warrant such assumption. Apparently it is a sharp cutting instrument which may be used for perforation. Two other instruments, viz.—Bridhipatra and Mudrika, are described, which could be used for similar purposes. (2) Garbha-sauku is depicted by Mukherji to represent a blunt hook, but it is classified under sharp instruments. Binod Sen illustrates it as a sharp hook. which must be correct. (3) Jujna-sanku means paired sharp hooks, but it has been figured by Binod Sen to look like Palfyn's "iron hand." Sir Bhagbat Sing Jee, in his book on History of Aryan Medicine. hints that this indicates the use of forceps as a conservative instrument by the ancient Hindus. This claim has not been established. Perhaps modern Hindu writers have been greatly carried away by their admiration for ancient Hindu medicine and in their zeal imagined that such instruments represented modern perfected types.

Retained Placenta.—Gentle pressure on each side of the abdomen combined with *shaking by a strong person,* seizing her behind, is the treatment recommended. Comment is unnecessary.

Puerperal Diseases.—All diseases produced during the puerperal period are described under a common heading—Sutika voga, and are considered very serious, often incurable. The descriptions are meagre and the treatment recommended is unsatisfactory. Mastitis and mammary abscess received some consideration. (It may be stated here that in 1908 Dr. Pearse, then Medical Officer of Health of Calcutta, drew attention to the incidence of Sutika or chronic diarrhoea with fever, which caused a death rate of 1.3 per cent of the total number of registered births in Hindu and Mohammedan puerperal women in Calcutta. It should, however, be mentioned that there is no accurate method of registration of deaths, so that the cause of death after childbirth, is put down under a generic term "Sutika," which apparently covers a number of distinct diseases. In 1920, Dr. I. B. Basu of Calcutta made a careful study of fifteen cases of so-called "Sutika." He came to the conclusion that the symptoms pointed to the existence of anemia, combined with an extensive chronic enterocolitis caused by colon bacillus. The terminal infection is due to tubercle bacilli.

Management of the Infant.—Detailed directions are given with

regard to this subject. The selection of a wet nurse also receives careful attention.

Diseases of Infants.—Almost all diseases in infants are supposed to be produced by constipation. Purulent ophthalmia is mentioned and is believed to be caused by bad milk.

From the above brief survey of midwifery in ancient India, one may reasonably observe that Indian medicine was in possession of an imposing treasure of empirical knowledge and technical achievement. Naturally, the knowledge of anatomy, physiology and pathology was practically nil, but diagnosis was founded upon carefully collected evidence of the senses and anamnesis; while prognosis was most fully developed. In the treatment of disease, prevention played an important part. Hygiene and diet were considered as important as drugs and other therapeutic measures. The pharmacopia was a rich one, consisting chiefly of substances of vegetable origin, although no small number of animal and mineral substances were employed. Surgery constituted the summit of attainment of Indian medicine and Hindu practitioners were accustomed to perform difficult operations with boldness and skill.

MIDWIFERY IN INDIA DURING MOHAMMEDAN RULE (8TH TO 18TH CENTURY)

During the Mohammedan rule in India, surgery and obstetrics appear to have fallen to a very low ebb. Although it is certain that Arabian physicians were acquainted with old Hindu authors, the Mohammedan conquerors of India did not adopt any special measures for spreading medical science of the Arabian school amongst the conquered race and we may safely consider this period of 1000 years (8th to 18th century, A.D.) as a period of stagnation or rather decline. Arabian physicians left the care of obstetric cases to midwives.

(To be concluded in February issue.)

Selected Abstracts

Abdominal Cesarean Section

Gandy: The Administration of Anesthetics in Cesarean Section.   Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 534.

Stovaine or gas and oxygen with local analgesia are the preferable anesthetics for cesarean section in obstructed labor. The association of contracted pelvis and malformations of the thorax with diminished respiratory capacity, cardiac embarrassment or tuberculosis frequently makes ether an undesirable anesthetic. Gas and oxygen with local analgesia is the preferable anesthetic when cesarean section is done for severe antepartum hemorrhage. Ether or gas and oxygen with ethanesal are employed when the operation is done for eclampsia. Chloroform is contraindicated in the latter condition.

Gas and oxygen with ethanesal are eliminated from the fetal system faster than ether. Scopolamine and morphine affect the respiration of the child and should not be given within six hours of the time of delivery. Chloroform favors uterine bleeding and should never be used after opening the uterus. Occasional administration of morphine after removal of the fetus prevents postoperative nausea and vomiting.   H. W. SHUTTER.

Holland, Eardley: Results of a Collective Investigation into Cesarean Sections Performed in Great Britain and Ireland from the Year 1911 to 1920 Inclusive. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 358.

Details are given covering 4197 cases of cesarean section.   The cases are classified according to indications as follows: contracted pelvis (3372), eclampsia and other toxemias of pregnancy (227), antepartum hemorrhage (208) and conditions other than the above (366).

Three thousand three hundred and seventy-two cases of contracted pelvis were operated with a gross mortality of 4.1%.   Twelve hundred and two cases operated before the onset of labor gave a gross mortality of 1.6%.   Three hundred and eighty-nine cases sectioned early in labor had a maternal mortality of 1.8%.   Cases operated late in labor gave a 10% mortality.   A 14% mortality followed the operation in 35 cases where attempts at induction of labor preceded section.   One hundred and one cases operated after unsuccessful attempts at delivery with forceps resulted in a maternal mortality of 25.7% and a fetal and infant mortality of 38%.   Three mothers out of six died where cesarean section was done after attempted delivery by craniotomy.

The more common causes of death in 122 out of 139 fatal cases operated for contracted pelvis were general peritonitis 49, sepsis 16, septicemia 10, pulmonary embolism 8, pneumonia (all types) 17, intestinal obstruction 3, and ileus 2.   Cesarean hysterectomy was done 46 times in the 3372 cases with a mortality of 17½%.   Of the 3392 children including 19 cases of twins, 122 were born dead and 131 died in the first two weeks, a mortality of 3.9% and 4.2% respectively. The fetal and infant death rates were directly proportional to the duration of labor.

The maternal mortality in 195 cases of eclampsia treated by cesarean section was 32%.   The mortality was three and one half times higher in the cases operated after the sixth convulsion.   Of 37 deaths in this group the toxemia was blamed for 20, peritonitis 1, embolism 1, pneumonia (all types) 8, suppression of urine 3, etc.   The fetal and infantile mortality was 50%.   Prematurity was given as the chief cause of infant death.

One hundred and thirty-nine abdominal sections were done for placenta previa. A mortality of 11.5% for the group is divided as follows: complete or central placenta previa 14%, incomplete placenta previa 9.3%.   The fetal and infant death rates totaled 27.3%.   Prematurity is again the most common cause of infant death.

Cesarean section for accidental hemorrhage gave a maternal death rate of 27% in 66 cases.   To control hemorrhage or remove uterine pathology cesarean hysterectomy was necessary in 30 cases with a resultant mortality of 46.6%. In all other cases the mortality was 11%.   The fetal and infant deaths in these cases totaled 86%.   Abdominal section with hysterectomy offers the easiest means of delivery in the badly shocked cases and provides a means of controlling hemorrhage from a uterus completely atonic.   Operation is not done primarily to save fetal life.

Section was done 259 times for obstructed or prolonged labor.   Obstruction was caused by fibroid tumors in 88 cases and ovarian cysts in 25.   Carcinoma of the cervix indicated operation 25 times, cancer of the rectum, bladder and colon 9 times.   The maternal mortality with cesarean section for fibroids was 10%, the fetal and infant mortality 25%.   Of 25 cases of carcinoma of the cervix, 6 mothers and 14 babies died in the hospital.   No deaths followed the operation for carcinoma of the colon, rectum and bladder.   Twenty-five operations in this group followed ventral fixation, interposition or plastic repair.   Impending rup-

ture of the uterus and rigidity of the cervix are each given three times as an indication for section. Congenital malformations obstructed labor eight times. Thirty-three cases came to operation because of malpresentation or excessive size of the fetus.

Grave maternal disease indicated operation 61 times. Of these, 40 were cardiacs in whom abdominal section resulted in a maternal mortality of 22.5% and 7 dead babies. Section was done twice for pulmonary tuberculosis and five times for intestinal obstruction. Operation was done ten times for habitual death of the fetus during labor. No mention is made of the number of cases in which a previous cesarean section indicated a repetition of the operation. The report is given in 89 pages of excellent detail invaluable to the obstetric surgeon.   H. W. SHUTTER.

Bride: Cesarean Section in Manchester. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 463.

Six hundred and forty-eight cesarean sections were performed in Manchester during the years 1911 to 1920 inclusive. Five hundred and fifty-seven abdominal sections were performed for contracted pelvis with a mortality of 4.1%; 15 for eclampsia with mortality of 66.6%; 25 for antepartum hemorrhage with mortality of 28%, and 51 for other indications with 10 deaths, a mortality of 19.6%. There were in all 50 deaths in the 648 cases, a gross mortality of 7.7%.

Twelve of the 23 deaths in cases where the operation was done for contracted pelvis were due to general peritonitis. Nine of these 12 women had had repeated vaginal examinations with the membranes ruptured. In four of the cases forceps had been employed unsuccessfully at home. The author feels that cesarean section for contracted pelvis has little risk in cases not previously examined or where no attempt has been made at delivery from below. In spite of a maternal mortality of 66.6% in the cases sectioned for eclampsia the author apparently considers hysterotomy a favorable method of delivery in this condition. Cesarean section is recommended for placenta previa of the central type occurring in the primipara with a viable fetus.

Forty-nine per cent of 190 cases operated prior to 1918 have since become pregnant. Thirteen of these aborted from causes not necessarily intrinsic. Abortion does not follow cesarean section with marked frequency. Of the cases coming to term three delivered spontaneously and 68 were subsequently sectioned. Precaution against pregnancy seems to be the most likely factor in seeming sterility subsequent to cesarean section.

Of 4 women allowed to deliver spontaneously, one died from rupture of the uterus. In view of the favorable mortality of 2% in abdominal sections performed before the onset of labor one cannot justify a 25% mortality in women allowed to deliver spontaneously after section.   H. W. SHUTTER.

Williams, J. Whitridge: A Critical Analysis of Twenty-One Years' Experience with Cesarean Section. Bulletin of the Johns Hopkins Hospital, 1921, xxxii, 173.

General conclusions are as follows: 183 cesarean sections were performed on 145 women in a series of approximately 20,000 deliveries and comprised 104 single and 79 repeated sections. There were 121 typical conservative sections, 4 extraperitoneal sections, 1 postmortem section, and 57 Porro sections. The gross mortality was 5.46%, but upon deducting cases in which death was not attributable to the operation, the net mortality was 3.45%; or 4.7% in the conservative and 1.82% in the Porro sections. All deaths except one from hemorrhage were

due to infection. Disproportion due to contracted pelvis was the indication for interference in nine-tenths of the black and six-tenths of the white patients. Several varieties of rachitic pelvis afforded the predominating indication in the blacks as compared with simple flat pelvis in the whites. The most frequent nonpelvic indications were eclampsia and serious cardiac decompensation. Cesarean section is not the ideal treatment for eclampsia and is indicated only in rare instances in which the cervix is rigid and undilated and venesection has not led to improvement. It is likewise rarely indicated in placenta previa. Only 7% of the children were deeply asphyxiated. The uterine cicatrix ruptured once in 48 women with repeated sections, as well as in 12 deliveries through the natural passages subsequent to section. Williams is convinced that cesarean section is abused throughout the country and that it is the cause of many unnecessary maternal deaths.   C. O. MALAND.

Harris: A Study of the Results Obtained in Sixty-four Cesarean Sections Terminated by Supravaginal Hysterectomy.   Bulletin of the Johns Hopkins Hospital, 1922, xxxiii, 318.

Supravaginal hysterectomy was employed more particularly in 2 classes of cases: first, to effect sterilization after repeated cesarean sections; and, secondly, to obtain more ideal results upon patients who were already infected or who were admitted to the service after being long in labor. In 223 cesarean sections —supravaginal hysterectomy was done in 64 instances with 3 deaths or a gross mortality of 4.68%. Only one (operative accident) was directly associated with the operation,—a cardiac condition and a pre-existing renal condition respectively accounting for the other two deaths. Thus only 1.56% resulted from the operation. Hysterectomy was done on 23 patients to effect sterilization; on 18 patients already infected or late in labor; 5 cases of atresia of cervix; 4 neglected transverse presentations; 2 hour glass contractions of uterus; 2 failure of bag or bougie to induce labor; 1 dystocia following ventral fixation of uterus; 9 for some other cause.   C. O. MALAND.

Brouha: Must Abdominal Cesarean Section Be Reserved for the Clean Case?   Gynécologie et Obstétrique, 1920, ii, 385.

Unfortunately, in many instances, dystocia makes itself evident only after labor is well along and after the bag of waters has been ruptured for various lengths of time. Should we say in such cases that we should not perform an abdominal cesarean? P. Bar does not hesitate to answer in an affirmative and his opinion is so outstanding and based upon so long and comprehensive an experience that it is vested with great authority. However, the author wishes to give the results of sixty conservative cesareans that make him hesitate to agree absolutely with this opinion.

In twelve of these cases all the ideal conditions enumerated by Bar were existing. In forty-eight of them, however, labor had been in progress for variable lengths of time, the greater number had been subjected to repeated examinations at home. In two-thirds of the cases the membranes had ruptured from two hours to five days before; dilation of the cervix varied from the size of a dime to nearly complete dilation. These cases were clearly not strictly clean and yet in the absence of fever and of all signs of uterine infection we did not hesitate to perform a cesarean to save the child. Success has followed our temerity.

Two of the twelve strictly clean patients died. None died among the questionable cases.

These results lead the author to believe that if one has full charge of the case from the beginning, one could allow the labor to progress a long time under strict aseptic conditions before the case would become sufficiently contaminated to lead one to decide against an abdominal cesarean in the face of a definite indication.   R. T. LAVAKE.

Bell, Blair: The Sterilization of Infection Incurred Before Cesarean Section Is Performed. Journal of Obstetrics and Gynecology of the British Empire, 1922, xxviii, 528.

The author in doing cesarean section on presumably infected cases employs the following method of wound sterilization. After delivery of the placenta a gauze saturated with sodium hypochlorite solution (Milton's fluid) is applied to the edges of the wound for one or two minutes. The gauze is then placed in the uterine cavity and before closing is pushed out into the vagina with a uterine dressing forceps. The pack is not removed from the vagina until after the patient is returned to her bed. To date the method has been employed in ten cases with good results.   H. W. SHUTTER.

Bauch: Cesarean Section upon the Dead and Dying Patient in Eclampsia. Zeitschrift für Geburtshülfe und Gynaekologie, 1922, lxxxiv, 596.

The author gives a brief historical review of postmortem cesarean section. He finds that it is one of the oldest recorded obstetrical operations. Although absolutely trustworthy statistics are not available, it may be assumed that the operation must have been attended by a certain percentage of successful results, even in early times or it should long since have been abandoned. The statistics of Schwarz for the years of 1836 to 1848 showed 107 operations without a single living child, and in Dohrn's later series of 90 cases, all the children were also dead. The more recent literature has given a number of successful results, yet Cathalos' series with 61% of living children and Böhmer's with 68% are probably explained by the greater tendency to publish successful cases.

Recent animal experiments have shown us more about the circumstances in which the fetus survives the dead mother for a time. When death occurred suddenly, as from hemorrhage or chloroform intoxication, the fetus survived longer, usually about five minutes. When the death agony was long drawn out, or there was a high fever, the fetus survived only a short time or even died before the mother.

Operation upon the moribund patient has been proposed and occasionally carried out to avoid the danger to the child of the death-agony. It involves far more complicated questions than does postmortem cesarean, and may assume a medicolegal aspect. for should the patient survive the operation for some hours, the operation may be charged as the determining cause of the fatality. Though in consideration of the rights of the child, postmortem cesarean may and should be performed even without definite consent when this cannot be obtained in cases of sudden death, a section upon the moribund patient should never be performed without consent of the relatives and consultation with another physician to confirm the dying condition of the patient. Whereas, in postmortem cesarean, haste is the great essential, section on the moribund patient should not be performed without careful surgical technic. The placenta should always be removed, as otherwise it may be expelled from the vagina after the death of the mother. Determination that the fetus is alive should be made before section on the moribund patient, yet is not an essential prerequisite for post-

mortem cesarean, for extraneous circumstances may make it very difficult to hear the fetal heart beat in a restless dying patient.

Cesarean section upon the dead or dying patient has been performed in the following diseases: heart failure, pneumonia, chronic diseases of heart; kidney or lung diseases; embolism, rupture of large vessels, cerebral tumor, meningitis, eclampsia, chorea gravis, peritonitis, pernicious anemia and burns. The eclamptic patient may die undelivered either suddenly in the first convulsion, or after an eclamptic coma of some duration. There are a number of factors which unfavorably influence the prognosis for the child in eclampsia: the frequent prematurity, the toxicity, and the asphyxia attending the convulsions. Yet in 13 postmortem sections and one upon a dying patient in 500 cases of eclampsia at the Kühn clinic, there were obtained three living children, or 21.4%. Since one of these 14 cases was a hydatid mole and another a macerated child, the three living babies represent 25% of the total possibilities. One of the three babies was, however, deeply asphyxiated and died within a few hours. Another lived ten months and died suddenly of ''inward'' convulsions. The final fate of the other is not recorded. But the saving of even an occasional life surely justifies the operation.   MARGARET SCHULZE.

Kerr, Munro: Indications for Cesarean Section. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 338.

With gradually improving results from cesarean section the upper limits of pelvic deformity for which the operation is indicated have been raised to 8.1 cm. Had we means of insuring a firm uterine scar many cases now handled by the older methods would be better treated by cesarean. Induction of labor does not come into competition as its results are seldom satisfactory when the conjugata vera is less than 3¼ inches. Induction of labor is indicated when the accoucheur has experienced difficulty in delivering by forceps at a previous labor and feels that a slightly smaller child could be delivered easily. With few exceptions when delivery from below is impossible, cesarean section should be done if the child is alive, craniotomy if it is dead. Pubiotomy, seldom suitable for contradictions of the inlet, is not employed enough for outlet contractions.

Cesarean section is indicated for obstructing fibroid tumors. Too many abdominal deliveries are done for abdominal cystomata. Frequently these tumors, even with the patient in labor, can be pushed out of the pelvis with the aid of Trendelenburg posture and deep anesthesia.

The only cases of eclampsia suitable for cesarean section are those with well-advanced pregnancy, in the absence of cervical dilation or previous attempts at delivery and in which there has been no improvement after six hours of blood letting, morphine and intravenous saline.

Marginal and lateral placenta previa are well handled by the conservative methods of treatment. Cases treated by the older methods carry a maternal mortality of from 4% to 10% and a fetal mortality of 40%. One hundred and thirty-one cases of placenta previa treated by cesarean section gave a maternal mortality of 10%, a fetal mortality of 15%. In the author's opinion cesarean section is the best method of treatment for most cases of central placenta previa.

Excluding the cases of accidental hemorrhage which can be controlled by conservative treatment, cesarean section and hysterectomy alone remain suitable procedures. In these cases abdominal section offers immediate delivery, control of hemorrhage and is frequently the means of saving maternal life.

Under special circumstances, brow, face and occipito posterior presentation,

rigid cervix, high retraction ring and scars from previous pelvic operations become indications for the operative procedure. Cesarean section is indicated when dystocia from ventral fixation or interposition operations prevent delivery. Cardiac disease and other maternal emergencies occasionally indicate operation. Such conditions as hydramnios, hydrocephalus, varicose veins and impacted shoulder presentations seldom justify abdominal delivery. Improved operative methods and results are gradually extending the indications for cesarean section.

H. W. SHUTTER.

Taylor, Charles J. G.: Cesarean Section: With Special Reference to Present-day Indications for Operation. The British Medical Journal, June 10, 1922, No. 3206, p. 909.

The author considers absolute indications such as (1) pelvic deformity where the conjugate is perhaps 2¼ inches or less; (2) hard solid tumors; as relative indications: (1) contracted pelvis with a conjugate between 3¼ and 3½ inches; (2) tumors such as fibromyomata and ovarian cysts; (3) placenta previa (he believes this operation should be performed in cases of central and lateral placenta previa, but not in the marginal form); (4) eclampsia (he thinks in some of these cases cesarean section is a matter of choice); (5) concealed accidental hemorrhage (section associated with hysterectomy); (6) ventrofixation. (cesarean section may be necessary where the cervix is tilted backward); (7) prolapse of cord (he does not recommend this as a routine practice for this condition); (8) impacted shoulders (he advises against general use of cesarean section in these cases, mortality of both mother and child being about 50%); (9) abnormal conditions of the child, such as postmaturity, rarely brow presentation, persistent occipitoposterior position, impacted breech (all of these conditions should be regarded as exceptional indications); (10) retraction and contraction rings (a conceivable indication for section); (11) scar tissue and a rigid cervix; (12) serious diseases of the mother, such as cardiac disease, advanced pulmonary tuberculosis. He mentions postmortem cesarean section as a justifiable procedure. Other occasional causes are mentioned such as extreme edema of the vulva, also large varix of the vagina and vulva. He raises a question as to whether cesarean section should be performed before labor has started and sees no contraindications to the performance of section before the onset of labor.

He thinks there is no reason for routine sterilization of the patient.

There are cases on record of repeated cesarean sections four, five, and even more times. The possibility of rupture of the uterine scar during pregnancy should be borne in mind. The writer seems to accept the dictum "once a cesarean, always a cesarean" only for pelvic contraction. In conclusion the author emphasizes the supreme importance of a careful watching of all cases during pregnancy, and stresses the urgent need for maternity beds in large towns and country districts.   F. L. ADAIR.

Henkel, M.: Cesarean Section and Its Indications In Modern Obstetrics. Medizinische Klinik, 1922, xviii, 917.

In addition to absolute and relative indications we now have prophylactic indications as well. Practically there are three forms of cesarean section: the classic, the intraperitoneal cervical and the extraperitoneal cervical.

It is easy to deal with the absolute indications for the operation but not so with the relative ones. The experienced obstetrician in dealing with contracted pelves prefers first to see the effect of labor pains before making any decision. The question of cesarean section is further complicated by the fear of infection.

There is no doubt that in the presence of infection the prognosis is much worse; but at present there is no means of recognizing the presence of infection early. The patient may be severely infected and yet show no symptoms of this and on the other hand, she may have no infection and yet show streptococci in the uterine secretion and in the blood and she may have fever and tachycardia.

Henkel believes the intraperitoneal cervical operation is the one of choice and describes his method of performing it. The patient is kept in the horizontal position throughout the operation. The indications for cesarean section may be extended because a difficult delivery *per vias naturales* under certain conditions may be more dangerous to the mother than a cesarean section. In placenta previa, e.g., the abdominal operation proves blood-saving; but it should be reserved for placenta previa centralis in primiparas. In eclampsia where the cervix is undilated and the head high, cesarean section is the quickest and most certain method of delivery for both mother and child. The author emphasizes that the technic of the operation is now standardized but the difficulties arise in placing the indications.   J. P. GREENHILL.

Jones, Arnold: A Plea for the More Frequent Use of Cesarean Section. British Medical Journal, July 16, 1921, No. 3159, p. 75.

The author advocates more frequent use of cesarean section in the treatment of placenta previa and eclampsia. He describes an operation which he thinks makes the uterine scar capable of standing the strain of future labors. He uses a midline incision, incising the external layer of the uterine muscle transversely just below the center of the uterine body. He makes a V-shaped incision about one-eighth inch deep. This layer is peeled upwards toward the fundus. The middle and inner layers are now incised longitudinally. The longitudinal incision is closed with a continuous catgut suture, the transverse incision in practically the same way. There is very little trouble with blood loss in this operation. He has performed the operation in eight cases; four of eclampsia, two of placenta previa, and two of contracted pelvis. None of these cases have had subsequent labors.   F. L. ADAIR.

v. Jaschke, R. T.: The Justification of Abdominal Cesarean Section in the Treatment of Placenta Previa. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lviii, 249.

Cesarean section nowadays is for the large proportion of obstetricians, the method of choice in dealing with severe cases of placenta previa especially placenta previa totalis. Hitschmann, who does not favor cesarean section as the usual method of dealing with placenta previa had a maternal mortality of 5% in his own cases of placenta previa treated by cesarean section. But he performed the classic operation. In the cases in which the low cervical cesarean is performed the mortality is not above 2% and it does not matter whether the operation is intra- or extraperitoneal. As Hitschmann himself mentions, the general maternal mortality for cesarean section performed for placenta previa is 3.6% whereas for the older methods (Braxton-Hicks version, metreurysis, etc.), it still is 7.6%.

Hitschmann's point of view as regards treatment is untenable because he fails to consider the life of the child. The lowest fetal mortality obtained with metreurysis is about 20% while the general fetal mortality where the older methods are used, is 30 to 40%. It is v. Jaschke's opinion that the child's life should be neglected only when a cesarean section would endanger the life of the mother.

Original Communications

PRESIDENTIAL ADDRESS*

AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

BY ROLAND E. SKEEL, M.D., LOS ANGELES, CALIFORNIA

IN casting about for a subject sufficiently dignified and important to bring before this Association my thought was arrested by the probability that any one surgical, gynecologic or obstetric question with which I might be qualified to deal would be better understood by most of those before me, hence my decision to wander for a few moments into the field of Association policy, a decision perhaps the more timely because this year for the first time we meet without the guidance of one for whom the welfare of this Association has been second only to that of his own family for more than a decade. I speak of course of Dr. Zinke whose loss we feel most keenly, whose influence was always for the best, and whom any of us would be honored in eulogizing were it not to be better done by one who knew his personal life more intimately than the rest.

At the outset I wish to disclaim any special liking for the term standardization as we now understand it with reference to medical and surgical procedures, hospital organization, etc. Indeed the word itself implies permanency, a state which obviously is impossible in any department of surgery at a stage in its career when new light is thrown daily upon its problems. Stability, however, meaning such a degree of standardization as will contribute to a fairly uniform

practice under the usual circumstances is highly desirable, and this degree of standardization has been reached in certain diseases of which cystadenoma of the ovary, cancer of the breast and pyosalpinx are examples. True, minor details vary with individual surgeons, depending upon their temperament, surgical judgment, and operative facilities, but the basic principles underlying the management of these surgical disorders are recognized and followed by all.

However, the status of the present day operative treatment of these conditions was not reached by a single step. On the contrary it was fought through, over years of advance and recession, with change of thought and technic, and while the originator of the operation may not have lived to see his ideas completely vindicated, his immediate followers did. The work of Sir Spencer Wells for ovariotomy, and Lawson Tait and our own Price for salpingectomy, exemplify what we have in mind, while Halstead, the chief exponent of radical extirpation for cancer of the breast must have derived great satisfaction from a contemplation of the complete acceptance of his ideas, and the enormous lessening of suffering and the saving of life which this acceptance carried with it.

In the treatment of the greater number of surgical disorders in the abdomen and the complications arising during pregnancy and labor, no such consensus of opinion exists; indeed, even in the management of normal labor a new school is arising which insists that every obstetric patient shall be converted into an operative case if only the obstetrician can get to it before the baby is born. From the pronouncements of another school one would be inclined to believe that cesarean section was the only legitimate method of delivery of a patient whose labor was a bit delayed and whose vagina had not been contaminated, and of course once a cesarean always a cesarean, while the methods of treatment for eclampsia are as far apart as the poles. To mention but a few on the surgical side: if one accepted all the literature, cancer of the cervix is curable by operation in over half of all cases presenting themselves and is never cured, radium cures many and cures none, the chronic appendix has subsided and the gall bladder has taken its place, in fact there must be a veritable epidemic of cholecystitis extending over the land, while peptic and duodenal ulcers are cured by medical and surgical treatment, and cured by neither.

What is now occurring in the study of the pathology, symptomatology and treatment of these surgical lesions, fundamentally is the same struggle which took place when Spencer Wells took up the routine practice of ovariotomy and Tait in England and Price in this country urged a knowledge of the true pathology and treatment of pyosalpinx, only increased in intensity by the great variety of intraabdominal

lesions which are revealed through the study of living pathology at the operating table; and multiplied many times by the number of operators and the present day opportunity afforded to publish their views. This struggle must proceed until some degree of stability is reached, but meantime great harm is done by the wordy barrage which comes from all directions, whose component parts are fired by skilled observers and writers, by those whose powers of observation and expression are limited, and by a multitude who shoot simply to make a noise and attract attention to themselves.

But little damage would be done if this barrage of words, facts and opinions was exploded at the mouth of the gun, as it were, and went no further; but the medical, exactly as the general public, still clings to the tradition of infallability in the printed word. Further, if this printed matter found its way only into the hands of those able to estimate it at its proper value it would be of minor importance, but the reverse actually is true. *Too much writing for publication of undigested, imperfect opinion is the bane of true surgical progress today.* When an unusual observation or the report of a unique method of operation, emanating from a source usually regarded as authoritative in a given line, is presented to an expert in that line, he is able to assimilate it, place it in its proper position and compare it with his own observations. If it is a new idea in etiology, pathology or symptomatology he seeks to confirm or overthrow it. If a new operation, he approaches it with the greatest care and circumspection. As an expert he understands the fallibility of authorities and weighs their promulgations accordingly, and if he is a really big man he recognizes that the intellectual giant, with intellectual honesty, who is never consciously or unconsciously swerved by the hope of personal advantage, and whose opinions can be followed without hesitation, in other words the Oslers of the profession arise only once or twice in a generation.

To the less experienced and the beginner in surgery the matter presents itself in a different light. Eager to learn, desirous of being fully abreast of the times, the published views confirm some ill-defined, vague notions of his own, and that which may have been purely speculative in the mind of the author is accepted as demonstrated fact by the reader, who thereupon hastens to present a paper upon the same or an allied subject. Multiply this one example by the hundreds, who, with laudable ambition, are hastening to break into print and give their brain children an airing, and we have an explanation of the confusion which exists in the medical literature of the day.

Another class, which the profession has vainly tried to eliminate for many years, is composed of those individuals always seeking an excuse to operate. The great bulk of our profession is sound and conscientious to the core; but admission to a medical school, gradua-

tion therefrom and subsequent interneship in a hospital, cannot re-
make the man who has entered the profession with his eye on its
presumed monetary advantage and who has a total disregard for
human health and happiness; consequently the occasional black sheep.
These are vastly encouraged by the printed opinion of celebrities that
cholecystectomy, panhysterectomy, cesarean section and version are
operations legitimately practiced for trivial indications; as they some-
times may be by the truly expert, but never are in the hands of the
last year's graduate or occasional operator among general practi-
tioners.

The American College of Surgeons has furnished one way, imper-
fect as it admittedly is, to designate the competent and weed out the
surgical purchasing agent, and great good has been accomplished in
an astonishingly short time. Excepting to the profession itself, how-
ever, the College means but little, as the public has by no means
grasped its purpose or importance.

So long as no laws exist which prohibit the practice of major sur-
gery and the surgical specialties which deal with fundamental organs
like the eye, it is of the greatest importance for the welfare of human-
ity at large that special societies and associations like our own, recog-
nize the heavy load of responsibility which rests upon them, as well
as upon their individual members It is our firm conviction that some
method should be adopted by which the presentation of bizarre meth-
ods of diagnosis, new and startling indications for operative pro-
cedures and extreme styles of operating should be withheld from
general publication until some degree of uniformity of opinion had
been arrived at by those with abundant facilities, and such experience
as would keep them from overstepping the bounds of safety for their
patients. A satisfactory solution of the problem is difficult.

It would seem that a portion of it lies with medical journals them-
selves, and that editorial disclaimers of responsibility might well be
abolished and editorial comment on the unusual substituted therefor.
While editors and editorial writers may have no more knowledge of
a subject than the contributor, their views are more likely to be unbi-
ased, and presentation of the opposite viewpoint reveals to the casual
reader not only that there is another side, but that it should be heard
and weighed before accepting all that even the most advanced re-
search worker or clinician suggests.

It might seem too extreme to suggest that special societies confine
the publication of their papers to the official transactions, and cer-
tainly such action would serve to smother many valuable ideas at
their inception, but it would be quite possible to abolish the practice
of publishing the discussions on these papers, and substitute there-
for the comments of an editorial committee appointed for that purpose.

All of us recognize that extemporaneous discussion frequently partakes of the character of schoolboy debate, that we always must revise our remarks for publication, and that even the revised version rarely says what we would have said if given sufficient time and space in which to express ourselves.

Such an editorial committee could have at hand a stenographic report of all discussions from which to make a single abstract, giving in the best form the *pros* and *cons* of the ideas advanced by the various speakers as well as the committee's own views, thus making a contribution of real value.

Your retiring President realizes that these suggestions appear a bit radical, but believes that either this or similar action will be found necessary in the not remote future. Believing this, he would like to see this Association demonstrate its courage in pioneering this as it has so many other advances in matters pertaining more especially to its purely professional objects.

By such a trifling innovation the first short step would be taken which in the course of time might lead to others more pronounced in their results. For instance, I think I am well within the truth in assuming that most of those in this country from whom radical steps in advance may be expected, as well as the majority of conservatives who class themselves as "not the first by whom the new is tried nor yet the last to lay the old aside," will be found in the members of the American Surgical Society, the American Gynecological Society and our own Association.

Probably it is chimerical to suggest that an arrangement might be entered into sometime in the future, by which these and other similar bodies would continue to publish their annual transactions but all in one volume and abolish journal publication altogether, knowing that the results of their work would gradually filter to the general profession through the medium of the organized county and state societies and the American Medical Association, but not until unformulated, unstabilized procedures had been weeded out and nothing but well recognized methods remained. Whether in this or some other manner it is our duty to do all in our power to hamper the incompetent, to assist the worthy who are striving to become efficient and competent, and contribute to the welfare of medicine as a whole by removing from public view such of our professional differences of opinion as are inevitable while we are going forward towards that goal of perfection which always is unattainable but toward which we should nevertheless strive.

TITLE INSURANCE BUILDING.

A CLINICAL CONSIDERATION OF TUMORS OF THE BREAST*

By John F. Erdmann, M.D., New York, N. Y.

THE most gratifying statement that can be made by a physician to a patient who consults him about a swelling in the breast is: "You have no cancer."

In correlating my material for this paper I have collected from my card index all operations upon the breast except those for mastitis, either chronic or suppurative, from January 11, 1905, to and including May 10, 1922, about 18 years, and find 468 cases recorded. There were also in this series 20 recurrence operations, which were in part mine and the remainder patients of others, one of these being operated upon four times in the scar and remote areas. Of the operated cases 281 were carcinoma, one of the entire number being a well advanced bilateral manifestation. There were 120 cystadenomata of which 102 were unilateral and 18 bilateral; sarcoma, 1; tuberculosis, 1; lipoma, 4; aberrant breast, axillary, 3, one of which was carcinomatous; adenofibromata, fibrocystadenoma, 27; and peri- and intracanalicular fibromata, 31; in all 58 (including intracanalicular cystadenoma and intracanalicular papilloma, etc.).

It will be observed that 60 per cent of all the cases selected for operation were carcinoma. This number does not represent by far the patients seen with cystadenomatous degeneration of such slight degrees as to be considered nonoperative. Neither does the large number of cystadenomatous breasts operated upon represent any evidence of operative furor in this pathological class, but they were in all instances patients with this type of degeneration so far advanced as to demand operative relief. Numbers of them had had single cyst operations done on various occasions, one in particular asking for radical relief after five individual operations by various operators had been done, each operation guaranteed as the last of her trouble.

It has been my experience to see but one tuberculous tumor and one sarcoma in this period of time and one aberrant breast undergoing malignancy, which finally required a re-operation, including the formerly normal breast.

There is but one instance in the carcinomata in which the second breast was invaded. This patient was inflicted with the second growth so remotely placed from the chain of lymphatics as to lead me to consider the tumor of primary origin, equal to that of the first

breast. There was one bilateral carcinomatous involvement almost equal in both breasts. The case is so interesting as to deserve recording.

C. M., forty-seven, single, admitted to hospital, March 17, 1921, discharged March 28, 1921. Presented tumors of the breasts, duration seven months. Family history, negative; no operations, no sickness. Personal history, never married; menopause two years ago, some slight spotting since. Present trouble began seven months ago, no pain, no discharge from nipple; no loss in weight. Physical examination, negative. Surgical condition: Definite asymmetry of the two breasts. The left presents a flattened out and retracted nipple. The entire breast is hard and rubber-like in consistency. It moves as a whole on the chest. There is a large, hard gland in the axilla, freely movable, hard and smooth. Right breast: very hard, especially about the nipple; no retraction of the nipple, but the skin retracted in other areas and was very adherent to underlying tissues. There were a few very small hard nodes in the axilla. Operation: bilateral Stewart incision; Result: Primary union. Pathologic Report: Bilateral scirrhous carcinoma, metastasis to lymph glands.

The pericanalicular and intracanalicular tumors were seen usually in the female from 17 to 35. The cystopapillomata, of which quite a few were recorded, were easily diagnosed at the first visit by the characteristic discharge from the nipple. In the nonrecorded cases of mastitis, I am quite satisfied that two recently operated upon were fat necrosis cases of the type described by Burton Lee. In neither of these did I remove more than the areas involved.

As to the question of bilateral involvement being primary or of the second breast being invaded through lymphatic conveyance, one is unable to decide, but I am rather fixed in my opinion as to the two patients specially cited. In the instance of the patient with the immediate bilateral involvements I am inclined to believe after very careful examination and cross-examination that the breasts were simultaneously invaded by primary growths, or almost so; at least I believe that neither growth was a metastasis from the other.

In a patient with involvement of the remaining breast four years after the first removal, the zone occupied, the discrete type of tumor, absence of any infiltrating process from the removed side and the absence of evidence by x-ray or any other metastasis, led me to a positive conclusion that involvement of the remaining breast was as much of a primary growth as the tumor in the removed breast. Unless we can definitely trace the metastatic chain across the breast, such instances as the one just cited should be classed as primary and not as metastatic.

In this series of patients but three were in the male,—one a recurrence and two primaries. I have previously reported (Dennis; System of Surgery) three male patients with tumors of the breast.

DIAGNOSIS OF MALIGNANCY

The most frequent reason that patients advance for suspecting malignancy is pain. It is most gratifying to be able to tell these worried callers that malignancies of the breast never begin with pain; that when pain is a symptom of cancer it requires no expert to diagnose the condition, this pain being due to compression involvement of the nerve, infiltration, or a large tumor, or exposed nerve filaments in an ulcerating tumor; that as a rule, malignancy of the breast is a single tumor, as compared with multiple tumors in cystadenoma, fibroma, etc., although one occasionally sees a malignancy present with a well defined multitumor of the cystic variety. Recently I removed a carcinomatous breast with two distinct nodules, four inches apart. The bilateral tumors are most frequently the cystadenomata and fibromata.

No better diagnostic objective evidence is known than the dimpling of the skin when the breast is grasped, as compared with the full rounded convexity in the noninvolved by malignancy. This dimpling sign is obtained very early. By lifting the breast from below, or by compressing it between two or more fingers, the dimpling will readily follow, while in the noninvolved breast, the convexity will remain or be exaggerated. This dimpling can also readily be seen either by direct or by oblique inspection, and by feeling carefully over the dimple one obtains with the palpating hand the sense of hardening or tumor. In more advanced patients, or in patients with a more disseminated growth, the classical orange peel skin is seen. The elevation of the breast affected, above the plane of the other, due to the lifting effect of the involved tissues, is seen in more advanced conditions.

If one were to rely upon retraction of the nipple for a diagnosis, operations upon the breast would be more common than those for the appendix. In a very large proportion of breasts there are single or bilateral retracted nipples that are absolutely normal otherwise. The retracted nipple of malignancy is due to the same cause as the dimpling of the skin mentioned above. Eversion of this latter type of retraction is impossible, while in the normally retracted nipple eversion is quite possible in the great majority.

Axillary Adenopathy. It requires an exceptionally enlarged gland to be found on palpation in the majority of patients, or an exceptionally thin subject is essential.

Metastases are important in their bearing upon the question of operative justifiability. One cannot be too careful in the readily palpable tumor in the search for secondaries, of the mediastinum or lungs, characterized by a dry cough; in the bones by pain allied to nerve distribution pains, such as facial, intercostal, and in my experience, frequently in the course of the sciatics, one or both.

One of my patients lived 11 years after a very extensive dissection. The first evidence of metastasis was hoarseness, increasing slowly in intensity. It was not suspected that the hoarseness was in any way due to metastasis from the growth removed almost eleven years before until x-ray showed a tumor, the shadow of which was the size of a tangerine orange and situated at about the arch of the aorta.

As far as my personal observations go, I cannot encourge the idea that metastases occur in the abdominal viscera in such frequency as we are led to believe by various observers. Therefore I am not inclined, in all patients, to practice Handly's resection of the upper segment of the rectus fascia, although I frequently do it.

In addition to the remote sites mentioned, the immediate sites call for consideration. Recurrence in the scar can be assigned to too small a skin flap removal, implantation by the using of forceps in the flap edges that have not been properly cleaned after use in the ablated portion, the conveying of cells on the gloves, towels and other instruments that have come in contact with the removed area. The fact that cells may be lodged in the lymphatic channels at a remote area must account for those shot-like bodies, seen at a distance from the breast involvement, even at times on the back, the scalp, etc. Occasionally the shot-like masses in the area formerly occupied by the breast are cystic formations about a ligature, etc., and will disappear in time.

No breast should be removed when the supraclavicular and cervical glands are so metastatically enlarged as to be readily palpated, but should be subjected to x-ray or radium for a time. This same statement holds in those patients with massive skin infiltration. I have recently had a marvellous disappearance of the skin infiltration in a woman of thirty-eight after x-ray application by the more recent high voltage machine, although the tumor proper maintains its original size after six months' treatment. No breast should be operated upon with a promise of cure or a great extension of life in which the growth, ulcerated or not, is adherent to the chest wall. This type should also be subjected to the ray or radium treatment, exceptions being in the instances when one can remove the ulcerating tumor and cover either by plastic or by grafting processes.

Neither do I believe that tumors should not be operated upon, but instead, treated by x-ray, when they are small. A regrettable incident occurred in my practice last year. A patient with a small nodule in the upper inner quadrant was advised by me to be operated upon. However, she had a relative, connected with a large hospital, which deals largely with malignancies and is well furnished with radium and x-ray appliances. By this overenthusiastic relative the patient was given every confidence of cure, and I lost sight of her

for six months. Upon her return to me at the end of this period, during which, she stated, she had been told that she was cured, the growth was still present, decidedly larger, and in addition there was distinctly evident adenopathy. Operation was again advised and consent at this time given. The growth was carefully examined by the pathologist, and no cell changes, due to x-ray "sickening," were recorded by him.

Recurrences may be exceptionally.rapid, and again very slow. The explanation for either is not to be obtained from the pathologist. At times, he will predict rapid recurrence, as was done in the patient with mediastinal growth eleven years after the operation. This patient was considered by two pathologists to be liable to a rapid (six to twelve months) recurrence, and without x-ray or radium treatment, lived eleven years before showing a suspicion of a secondary tumor. No autopsy was done in this case, so that even with the x-ray picture we are still in doubt as to the nature of the growth. The youth of a patient, as in cancers at any site, tends to produce early or rapid recurrence or metastasis. The zone of the tumor, I am led to believe, may also be a factor in rapid metastasis. My most rapid recurrences under this heading are secondary to tumors in the axillary border of the breast, and also in the fat type of patient more frequently than in the lean.

The question of doubt in diagnosis is settled in the majority of instances by an immediate pathologic examination of a frozen section. I do not believe that a wide resection of a growth for immediate analysis endangers the patient at all. I cannot make the same statement for those patients in whom the specimen is removed days or weeks before the breast is removed. The clinical picture on gross section of these questionable growths is as a rule so clear that the experienced operator in the majority of instances does not require the microscope except as a confirmatory means.

X-ray or radium as a preliminary to operation is in my opinion at the present time a "follow the leader game" that will require some years to satisfy us definitely as to its practicability. Use of these agents subsequent to operation is today largely enhanced by the advertisements they have received in the public press and by the friends of the patient. I must say that my cases longest free from metastasis were not treated with x-ray, as at that time x-ray and radium were not in their present-day development.

To be effective in the prolonging of life or making a cure, at present the most painstaking and extensive dissections are necessary. I am unfortunate in this discussion in being unable to bring before you statistically my recurrences as to site and time as but forty-three replies were received to 150 questionnaires sent; neither am I going

to entertain the question of pathology. The most radical operation consists in the complete resection of the pectoral muscles, cleaning out the axilla of glands and fat, and extending the excision at times to the supraclavicular space. I have not practiced the removal of the pectoralis minor, except when unable to freely approach the vessels and nerves of the axillary and subclavicular zone. No functional disturbance follows the removal of both pectorals, therefore no hesitancy in removing them should exist.

The questions to be considered in a breast amputation must be: Is it justifiable from the standpoint of recurrence or metastasis? Is the mortality chance sufficiently low? Will the function of the arm after operation be preserved? The answers to the two preceding questions are self-evident, as a rule.

The arm function should never be involved. Free motions are always possible when orders for motion are properly carried out, in practically every incision devised. The greatest impairment of motion may arise in the Willy-Meyer-Halsted incision of years ago, where the axillary edge of the pectoralis major is followed. This line of incision when healed has to be stretched when abduction is instituted and therefore in the nervous, hypersensitive, etc., limitation may be the result. If on the other hand the modified incision be used in which the incision slopes gently over the deltoid with convexity upwards, when the arm is abducted the positions of origin and termination of this type of incision are brought nearer together. The Stewart incision has been used in over 75 of my patients since 1916, with no great difficulty in exposure and no great obstruction to motion after the first few weeks, although many patients complain that the upward (abduction) movement drags on the chest wall scar in the early weeks following operation. The advantage of this incision is purely cosmetic and should be used in selected cases only.

The mortality in my carcinoma cases was one, and this death was partly attributable in all probability to a siege of streptococcus hemolyticus infections that we had in the hospital at that time, also due to a second operation being done within eight or nine days later. This patient refused anything but a removal of the suspicious growth and demanded waiting for eight or nine days after being told that the pathologic report was carcinoma. On operating radically, the area from which the tumor was removed was found filled with clot and the surrounding tissues ecchymotic. A complete removal was done, a rapid rise in temperature to 103° in two days, purulent metastasis was observed all over the body, joints, cellular tissue, etc., with death resulting in ten days. Culture returns from the pus at the various sites was always that of streptococcus hemolyticus.

It is rather pleasing to record relatively few chest complications

in so large an area of exposure to trauma and infection in the respiratory area.

Cystadenoma, single cyst, or the blue dome cyst of Bloodgood, cystofibroma, multiple cyst, intracanalicular, pericanalicular, or adenofibroma are as a rule all readily diagnosticated.

In the cystadenomata and multicystic breasts one feels a single or many small nodules. Very often careful massage from the periphery to center will cause to be extruded from this nipple a fluid varying in color and consistency from watery to pale straw to purulent or milky or even bloody or chocolate brown appearance. In all but the bloody or chocolate colored fluids one can safely say that he is dealing with a benign condition. This type of growth is also prone to be bilateral and among its many names, the term "old maid's breast" is frequently applied. When the discharge is bloody or chocolate colored the diagnosis is usually that of intracanalicular papilloma or a papillomatous cystadenoma. Again this type of discharge may be due to bleeding from a nonpapillomatous cyst with a malignant growth in the wall of the cyst. In the latter instance the precautions taken in a definite malignancy had better be observed. By careful palpation one is often able to outline a tumor in the area circumscribed by the outer margin of the areola and usually close to the nipple. On section of this tumor the eye frequently sees the cockscomb-like papillomatous growth; these usually grow from the inner wall of one of the larger ducts. The question of these papillomata being malignant is disputed by many. I believe that a papilloma of the breast is as dangerous as a papilloma of the bladder or rectum. etc., and that therefore radical removal is in order,—at least the removal of the breast is demanded.

In an article (*The American Journal of Surgery*, January, 1912) I called attention to this type of tumor, recording a series of seventeen patients and several illustrations taken from the removed breast, presenting very typical papillomatous growths and cited the work of A. A. Strasser, Arlington, New Jersey, who credits Bowelly (St. Bartholomew's Hospital Reports, 1888) with being the first to use the term duct papilloma, etc. I further stated that the question of malignancy in the early stages can be answered in the negative, but that they do become malignant. as evidence, Greenough and Simmons report 14 per cent in the pedicles and Bloodgood at that time claimed 50 per cent in the cases observed at Johns Hopkins. My conclusion in this quoted article was that in small growths, excision of the growth suffices,—while in larger growths amputation of the breast is imperative. I shall modify this now by saying that I feel that all papillomatous breasts should be amputated.

Canalicular Fibroma, Intra- and Peri-.—In one instance a very large

growth, including the left breast, weighing five pounds, was removed, the clinical diagnosis of which was sarcoma, the pathologic an intra-canalicular fibroma with no gland invasion. Complete removal was done. Six months later the patient coughed up a piece of tissue. Pathologic diagnosis was sarcoma. At about the same time the entire cutaneous area was involved with growths from the size of a French pea to a hazelnut. These were subsequently pronounced sarcoma. The inference is, either that the slides were wrongly read by the first pathologist, or that the original canalicular growth degenerated into a sarcoma at some point that escaped the pathologist's attention.

As previously stated my list of operations for cystic breasts does not represent an operative furor—these operations were done for demand reasons, persistent soiling of the linen by leakage, rapid growths, reoperative disappointment, and fear of more operations on the part of several who had from two to five removals done with palpable recurrences, rather new growths or young cysts enlarged.

In those patients in whom we intended removing a single cyst, but whose breast tissue we find studded with numerous cysts, in size just visible to that of a French pea or larger, I for a time did a subcutaneous resection, leaving the nipple, then for a period I removed breast tissue and the nipple, while now, after explaining the two methods, I follow the patient's wish of leaving the nipple or removing it.

These patients do not have the feeling of mutilation, as expressed by Bloodgood, and more recently by Peck. I feel that if they are to have the operation created in their minds many times by propagandists and annual cancer weeks, newspaper notoriety, etc., a placid mentality due to a complete operation is far better than a diseased mentality with a less radical operation, not only for the tumor-bearing individual, but also for each of her relatives and friends.

While cancer week notoriety and propagandism is desirable, nevertheless I have found from my office experience that a great deal of unnecessary mental suffering is created during these periods.

In the single growth, the blue-dome cyst of Bloodgood, the discrete fibroma and the canalicular growth, the operation of removal resolves itself into a resection of the area well outside the tumor, with proper suture repair.

In conclusion I should like to emphasize the belief on my part that a growth in the remaining breast is as likely to be of primary origin as that in the breast first removed.

Further, that at the present day we are unable to state what the influence of x-ray and radium is, either as a preoperative or postoperative aid. But in view of many apparent reductions in size, etc.,

previous to operation in cases considered nonoperable, the use of x-ray and radium should be encouraged. Even in view of some of the glowing reports at present regarding nonrecurrence, postoperative treatment should be substituted for preoperative, until some definite proof of its help or inefficiency has been established, since too few years have passed in my opinion for positive results to be shown.

Further, that in the presence of late metastases the powerful currents of the present day should be given a thorough test to prove or disprove the efficiency of this method of treatment.

That the most thorough and painstaking wide removal, with remote glandular and fascial dissections will tend more and more to increase our percentage of cures and extension of life. That the radical operation is attended with so low a mortality as to promote a greater desire on the part of consulting physician to demand operation.

60 WEST FIFTY-SECOND STREET.

THE CERVIX A FOCAL POINT OF INFECTION*

(WITH A UNIQUE CASE IN ILLUSTRATION)

BY G. K. DICKINSON. M.D., F.A.C.S., JERSEY CITY, N. J.

ABERNETHY, that original surgeon of a century ago, was chided because, in a lecture before the Royal College of Surgeons, he chose as his topic, "The Greasy Poultice." Perhaps the selection of a trivial subject like the above may invite criticism, but it is hoped some points which have been neglected may be brought out for illumination.

Previous to Emmet's time, little note was given to the cervix and its pathology, but his masterly work drew attention to cervical lacerations, created for a while some scientific interest, and led to deductions at least of temporary value.

The profession having had its mind so largely on the major pathology of the pelvis, the comparatively insignificant lesions of the cervix have been neglected. This organ has been termed the neck of the womb. By some it has been considered a buffer; by those of mechanical mind, a part of the leverage system of the uterus; by others, but a passageway for the flux and the sperm.

The cervix is developed from the second part of Müller's duct, independently of the body formed in the first part. Later the two are joined, the juncture, the internal os, being a physiologic barrier to invading germs. Histologically, it is more largely composed of cir-

cular muscular fibers and lined by a mucosa, containing funicular glands and ramifications. These glands secrete mucus. Thus we see that the cervix is an independent organ, embryologically, histologically and physiologically independent of, but correlated with, the uterine body.

The lymphatics of the mucosa begin as open spaces around the gland cells, which open into the lymph channels, some to pass directly to the parametrium and others connect with those in the body of the uterus, giving free passage of their content, normal or pathologic, not only directly to the region of the adnexa, but to the tissues of the corpus.

Whether through traumatism, or possibly through the blood stream, the cervical mucosa may become infected and inflamed. Various microorganisms have been discovered: colon bacilli, streptococci, staphylococci, and gonococci. The relation of the cervix varies with the type of germ. The streptococci and staphylococci generally produce acute conditions. In the majority of instances, their life is short. It is said that the chronic type of endocervicitis is seldom the result of their invasion. Perhaps a local immunity has been acquired to them from long association. The cervix does not seem able to immunize the gonococcus, a germ of communal life and of more recent introduction. It will remain in the follicles, saprophytic, for an indefinite time. Its tendency is to bring out fibrin, inducing a more chronic type of inflammation with hyperplasia and thickening.

Germs and toxins are disseminated through the lymph stream, generally bilaterally. Incident to the lymphatics that pass through the body of the uterus, a hyperplasia is induced, fibrous metritis, so-called, with resultant phenomena and symptoms, namely, hemorrhages, dysmenorrhea and sterility. The lymph channels which carry towards the adnexa may determine parametritis and infections of the fallopian tube and even the ovary.

The symptoms of endocervicitis, *per se*, are difficult to determine because of commonly associated and complicating pathology. We can recollect, however, in the days when trachelorrhaphy was so commonly done, before the major pathology of the pelvis had been recognized and exploited, that those who had a simple repair, thereby a reduction in the amount of infected mucosa, obtained considerable relief from disturbing symptoms. There was a lessening of backache, the uterus would diminish in size, thus giving relief from drag. Menstrual irregularities would be bettered. Perhaps, to a certain extent, our enthusiasm was taken up by the patient with a psychologic effect.

The operation recently exploited by Sturmdorf and others, whereby the mucosa alone is dissected out, provides a way of determining more exactly the relation of endocervicitis to the symptomatology of

the patient and a better guide for estimating the value and necessity of such operation from a clinical standpoint.

To Rosenow, also, are we obligated, for the cervix uteri has been compared to the tonsil, perhaps with good reason. The tonsil contains lymphatic tissue. It is in a position to stand the brunt of a larger number of microbes, as well as changes in atmospheric conditions; nevertheless, the mucosa of the cervix, even though relatively secluded, in its crypts and its comparatively sluggish circulation, possesses the possibility of harboring such germs as may reach it.

Germs developed in regions highly vascular, of plentiful oxygen supply, are prone to produce active processes when disseminated through the body. They are inclined to locate only in organs well supplied with blood, which would permit of active pathology. Germs which have developed in organs less vascular, where the oxygen is not abundantly supplied, when disseminated incline towards tissues poorly supplied. Hence, the germs which leave the cervix do not give active lesions in important organs, but find their contentment principally in the fascias with vague symptoms.

Those who have made an intensive study of their patients for focal infection, who have removed teeth, tonsils, appendix, gall bladder and colon, have occasionally given relief by attention to the cervix. We have in mind, one case which will demonstrate with emphasis the occasional importance of this organ in the mighty problems of the body:

Mrs. C. H., para ii. Five feet in height, normal weight one hundred twenty-five pounds. Quick mentality, doing her work well. Thyroid not easily palpable; laryngeal rings rather prominent. Skin inclined to dryness. In March, 1912, developed an urticaria. Just before each exacerbation she had an indefinite earache, left side. Shortly, anorexia supervened. Not only was there loss of appetite, but food was distasteful. Then insomnia. She was referred to a competent ear specialist who found no defects. For six weeks she was under the care of a leading dermatologist who recommended the mountains, without relief. During the writer's absence in Vienna for the summer months, she advised with an internist, who diagnosed stomach trouble. Then an abdominal surgeon, who treated her for intestinal fermentation. Next to an obstetrician, who said she was in the change of life. From him she went to a neurologist, who told her it was nerves.

On the writer's return, September 1, she was referred again to one of the leading skin specialists in New York, who put her on a diet of sour milk. By x-ray he found a ptosis of the stomach and advised operation, although he could promise no cure. This she declined, and then consulted a leading internist who called it a type of rheumatism. Next to another dermatologist who gave her salves and put her on a milk diet.

By this time she was a pitiful specimen, having fallen from her normal weight to ninety-eight pounds, markedly emaciated, extremely nervous from constant itching, loss of sleep and abstinence from nutritious food. It did not seem as if anything would be of avail, and, like a severe neuritis, time would wear her out and prove fatal from exhaustion and starvation.

This brings us around to May, 1913, when she reported suppression of menses for two months, with distress in the uterus. Feeling that at least she could be relieved of this, we had her come to the office and with a sharp curet the mucosa of the cervix was thoroughly scraped, hoping thereby to induce a flow. This was successful, flow coming on and lasting five days. But the unexpected occurred. Four hours after the curettage, her earache started and she then had the most severe attack of itching and wheals she had ever experienced. For twenty-four hours it raged, then subsided and the third day had entirely disappeared. That was on May 16. Until May 28, she was entirely free from her distress, there was no itching, hunger returned, she ate freely and contentedly, insomnia disappeared, and her body filled out. On May 28, she was again seized with the hives, preceded by pain in the ear. Empirically, we again curetted thoroughly. An exacerbation followed the curettage, but within twelve hours it had all disappeared. She could sleep and had no trouble whatever until December 20, 1913, when she went over her regular time a few days. The itching recurred mildly. Curettage completed the cure.

To us this is a very evident case of focal infection. Not thinking there was any relation between her cervix and her miserable condition, no particular study was made of the endometrium. The cervix was not hyperplastic, she had no laceration, the mucosa was not exuberant, nor of abnormal appearance; in short, there was no endocervicitis as ordinarily recognized. The stirring up of a local condition by the curettage led to an active absorption and exacerbation of symptoms.

Résumé.—The cervix is a definite organ with a distinctive function. As a portal to the endometrium it allows passage of Nature's fluids. It also picks up and carries into the recesses of the mucosa bacteria, where they are either destroyed or become saprophytes.

Harbored microbes may inflame the cervix and through the lymph stream cause more or less regional reaction, or, by the blood stream a varied expression.

The cervix may act as a focal point for infections.

280 MONTGOMERY STREET.

RADIUM IN THE TREATMENT OF UTERINE HEMORRHAGE OF NONMALIGNANT TYPE*

By Edward A. Weiss, M.D., F.A.C.S., Pittsburgh, Pa.

(From the Gynæcological Department, Mercy Hospital)

FOR several years there existed considerable skepticism in the minds of many as to the permanent value of radium in the treatment of uterine bleeding. The careful studies of John G. Clark, Bailey, Stacy and others have established beyond any reasonable doubt the efficacy of radium in the treatment of certain types of profuse bleeding of nonmalignant origin. The brilliant results obtained in some cases having been so pronounced, it is not surprising that the procedure would be abused by inexperienced persons using radium when not indicated, with the result that unfavorable reports have frequently been published.

With the broad experience of physicians and gynecologists of note to guide us, there should be no question as to the real merit of radium, and failure to appreciate it as a valuable therapeutic agent can be attributed to either prejudice or lack of experience. It is a fair assertion to make that no gynecologist is justified in withholding his willingness to consider the employment of radium in the treatment of selected cases of uterine bleeding. At the same time we do not subscribe to the statement that radium has supplanted surgery in the treatment of fibroids as in all probability there will still remain a large percentage of tumors requiring operation.

So convincing and complete are the reports of Clark and Norris in a recent analysis of their radium work that further comments would seem unnecessary, and while very little can be added to their conclusions, the reports from other clinics should be added to our gynecologic literature. A most careful and honest follow-up of the work from various gynecologic clinics should be tabulated for a long period of time in order to establish the status of radium and in a measure standardize the treatment. Our series of cases analyzed in this paper bear out to a large extent the observations of others. The results obtained were sometimes surprising and accomplished with wonderful ease as compared with operation, yet a critical attitude should be maintained and enthusiasm and optimism should not wean us from the well established operative treatment so successfully practiced for many years.

A series of one hundred cases in which bleeding was the only or

---

chief symptom, were selected for this study. It does not include our early cases when the technic was not definitely established and when mistakes in the selection of cases occurred, nor does it include cases treated during the past six months as not sufficient time has elapsed to tabulate these end results. In this group were eighty-three cases of submucous or interstitial myoma, four of adolescent bleeding with no pathologic findings and thirteen of functional menorrhagia or myopathic bleeding. Curettement as a diagnostic measure to exclude malignancy was performed and a careful selection of cases for radium treatment was made in every instance. When any doubt existed, operation was resorted to rather than radiation. With the exclusion of such doubtful cases, it follows that very few untoward or unsuccessful results were obtained. A rigid standard of indications and contraindications must be adhered to in order to obtain uniform results. The technic in every case was practically the same. The patient entered the hospital twenty-four hours before treatment, during which time the same careful physical examination was made and all routine urine, blood and Wassermann tests were completed, and the usual preoperative preparations likewise followed out. As the cervix is usually soft and patulous in these patients, due to the existing or previous bleeding, it is easily dilated, in which case an anesthetic is generally not necessary. In very nervous individuals the administration of morphia one-half hour before treatment was often sufficient, but in the presence of a rigid hymen or firm cervix, gas-oxygen was given. The depth of the uterine cavity, the size, mobility and consistency of the fundus was noted, a careful palpation of the adnexa made, a formal curettement was done and the curettings preserved for microscopical study. Radium needles of appropriate dosage, usually fifty mg., are screened in 2 mm. brass capsule and rubber tubing. Firm gauze vaginal packing to maintain the screened radium in the uterus is essential. In the average case the patient was kept in bed two or three days, but those more debilitated by long continued bleeding remained in the hospital longer in order to build up the general condition.

Eighty-three cases of the study were bleeding myoma. In selecting myoma cases for treatment, only those that were not larger than a three months' gestation were included. Intraligamentary or degenerating tumors were not considered suitable for radium. In spite of some favorable reports from other clinics, pedunculated tumors were also excluded in this series, likewise those suggesting degenerative changes were reserved for operation. Any evidence of inflammatory changes in the adnexa, either acute or chronic, contraindicated radiation. It has been repeatedly pointed out that chronic or latent adnexal inflammations are frequently excited to fresh reaction following

radium treatment. In our earlier series, two such instances were encountered with the result that a protracted convalescence ensued. after which radical operation was necessary. Six instances of rather large submucous tumors in uteri containing interstitial nodules were encountered. These projecting tumors were removed either by torsion or removed through a split cervix. In these cases the bleeding would in all probability have been arrested by operation alone, but radium was used not only to reduce the large, flabby uterus but to have an inhibiting effect on the remaining nodules. Curettings from one case showed an unrecognized carcinoma of the fundus. Radium had been introduced at the same time as polypoid endometritis had been diagnosed from the gross appearance. As we believe that fundal carcinoma is best treated by hysterectomy, radical operation was advised but this was refused by the patient. Repeated examinations have shown no recurrence of the bleeding after two and one-half years and it is fair to assume that the disease was arrested.

The most spectacular results were obtained in eight cases in which the blood picture was that of a severe secondary anemia due to bleeding myomata. Three of these cases presented a hemoglobin below thirty-five with accompanying low general physical picture contraindicating operation. Before the advent of radium in our therapy. such cases would of necessity require blood transfusion and much preoperative attention. With radium, the arrest of the bleeding was prompt with a rapid improvement of the patients' general condition. Two cases of this group of eight had a return of the bleeding within a year. The tumor had not decreased greatly in size but the condition of the patient was so good that hysterectomy was easily and safely performed.

In addition to the two cases mentioned, one other required operation, not on account of recurrent bleeding but for relief of persistent and aggravated pelvic pain, associated with occasional temperature. Operation disclosed an unrecognized secondary pyometrium due to unusual contraction and stenosis of the cervix following the radium. This is the only instance of its kind encountered. Some authorities believe that radium exerts its influence largely on the endometrium as well as on the ovaries. The mucous membrane of the uterus is destroyed by the direct effect of the secondary beta rays and while microscopical examinations of the endometrium in uteri removed after radium application have shown no definite necrotic changes, yet it is reasonable that such should occur. In discussing the action of radium on the uterus, Schmitz states that part of the endometrium receives an erythema or a first degree burn, another part a second degree burn and the portion in the immediate surroundings of the radium a third degree burn. Imperfect drainage through the cervical canal would

favor retention of the debris, and so favor the formation of pyome-
tra. Since the occurrence of this complication in our series, it is
the rule to explore the cervical canal to test its size and pathological
state in all cases developing symptoms such as temperature or soft-
ening of the fundus after radiation.

Great care was exercised in using radium in women under thirty-
five and whenever it was used, only minimum dosage was given. It
is generally admitted that in women in the child-bearing age, myo-
mectomy is the better method of treatment as it is not infrequent
that even a moderate dose of radium produces menopause. In treat-
ing women who can and should have children, the child-bearing
function of the uterus should be preserved. In this connection we
venture to condemn in unmeasured terms, the unscrupulous and
unprofessional employment of radium as a direct means to prevent
conception by producing a premature menopause especially when no
pathology is present.

The unexplained uterine bleeding in adolescence and young women
has often taxed the skill of gynecologists, and its unsuccessful treat-
ment has resulted in many deaths. Numerous explanations have been
offered for this peculiar type of bleeding and while hyperfunction of
the ovary has been generally accepted as a causative factor, yet the
various remedies as glandular extracts, serums, styptic and curette-
ments fail to arrest the bleeding. In the past, hysterectomy has often
been resorted to in order to save the young woman's life, but the
unfortunate sexless life of the individual resulting, is sometimes worse
than death. With the advent of radium, an almost specific has been
obtained, and while radium is more applicable in women at or near
the menopause on account of the large dosage employed, yet with
care and judgment, the excessive bleeding of the pubescent girl can
be reduced and regulated. In our series four instances of profuse and
almost uncontrollable bleeding were encountered. In one case the
patient, a fourteen year old schoolgirl, with excellent physique and
negative history, had three normal menstrual periods after which the
flow became excessive and prolonged. Rest in bed, forced feeding,
animal serum, various medications and uterine packing had little or
no effect. The blood picture became so alarming that even hyster-
ectomy could not be attempted. The insertion of 25 mg. radium
screened in the uterus for eight hours arrested the bleeding and pro-
duced an amenorrhea for six months, after which the last two peri-
ods have been somewhat more profuse but the general condition and
blood picture are practically normal.

A young woman of twenty-eight (a case of hemophilia) who bled
excessively had been previously transfused. With a return of the
uterine bleeding, radium was proposed and as she refused to submit

to the production of menopause, a minimum dose of 150 mg. hours was given. Great improvement was noted for six months with practically normal menstruation. After two rather free bleedings a second dose of 150 mg. hours resulted in a return to normal. A third case less severe in type required three doses of 25 mg. each for six hours before the menses became normal. It seems more conservative to resort to repeated small doses in young women rather than employ a single large dose. In other words a dosage of 1200 mg. hours can safely be used once in a woman after forty with pronounced result, yet in a young woman, 200 mg. hours used once or even three times if necessary would be efficient. and yet not necessarily rob her of the possibility of motherhood. Pregnancy has not occurred in any of the cases treated, yet with normal menstrual function, such possibilities are very favorable. Clark, Stacey and others have reported several instances of pregnancy following radium in minimum dosage, so that it is most important to keep such possibilities in mind when treating women in the child-bearing age.

The action of radium in controlling bleeding in myoma and myopathic conditions is an interesting study. Several explanations have been offered. Bailey believes it exerts its influence in three ways: (1) by action on the ovaries causing a destruction of the primary follicles. This would lead to a failure of ovulation and a consequent cessation of menstruation and would possibly lead to a retrogression of the growth similar to that which often follows the menopause. (2) By the destruction of the mucous membrane of the uterus through the direct effect of the primary and secondary beta rays. (3) By the effect of the gamma rays on the blood vessels leading to an occlusion or partial occlusion of their lumen.

Bleeding at the menopause in the absence of carcinoma, fibroid or other pathologic condition not infrequently gives rise to much concern both to the patient and physician and while this idiopathic bleeding rarely assumes serious proportions, yet the fear of possible malignancy is such that prompt relief is frequently demanded by the patient. In four of this series, the menorrhagia and metrorrhagia were pronounced. Gross pelvic pathology as well as cardio-vascular disease were eliminated as causes. The ages of the patients were forty-six, forty-nine, fifty-two and fifty-three respectively. Fifty mg. radium for twenty-four hours produced a complete cessation in every case. Curettings showed no hyperplasia or malignant changes so that atheroma of the uterine vessels was doubtless the underlying cause of the bleeding. The results obtained in this type of menorrhagia frequently classified as hyperplasia. fibrosis. uterine insufficiency or chronic metritis are so satisfactory that no surgeon is justified in resorting to radical hysterectomy to obtain a cure. It is certainly

not acting for the patient's best interests if he does not employ radium if procurable.

Not included in this series were four cases of fibroid bleeding that had been treated in other clinics without relief. Analysis of the history showed that very severe localized peritonitis followed the radium introduction and it was quite evident that a pre-existing adnexal disease was renewed by the radium treatment. This experience demonstrated very forcibly that a careful diagnosis and study not only of the tumor but existing complications is most essential. It is true, therefore, that the gynecologist and not the internist or roentgenologist should employ radium in the treatment of pelvic conditions, as the success or failure of its application depends primarily upon a correct and complete diagnosis.

In all cases receiving full dosage in this series, forty were relieved at once without return of the bleeding. Thirty-five menstruated once, fifteen menstruated three to five times, ten received two treatments. The irregular bleeding for the first ten days after treatment is not to be attributed to the radium but rather to the effect of the curettement, if not due to the disturbance of the ovarian hormone. It has been noted that a larger percentage had leucorrhea in varying amounts for the first two to five months. Frequently it has been very annoying and irritating, but generally is best relieved by douches of bicarbonate of soda. Probably the most annoying sequelae in our series has been nausea and vomiting while the radium is *in situ*. In many instances, it was attributed to the preliminary doses of morphia in those patients who were not anesthetized. However, the nausea was present in eighteen cases who received neither morphia nor gas, so that we have designated it "radium sickness" for want of a more definite explanation.

The decrease in the size of the uterus was generally not manifest before the tenth week after which the shrinkage became more pronounced. As a general thing, the menopause symptoms were more acute following radium than occurs normally but in most instances the administration of ovarian residue or corpus luteum helped to reduce the severity of the symptoms. The possibility of producing the menopause even with minimum dosage should be explained to the patient, especially younger women. In one instance the use of fifty mg. for six hours in a patient thirty-two years old produced a permanent amenorrhea with unusually severe menopause disturbance. The mental depression and disappointment was so acute that a serious nervous collapse followed, from which she is very slowly reacting but the sexual function is completely inhibited. The splendid results following radiation of fibroid tumors has unfortunately resulted in such a degree of optimism in some quarters that it is used in almost

every type of uterine tumor. This is most unfortunate as its indiscriminate use will often result in failure or aggravation of existing pathology. Only in exceptional circumstances as in the presence of serious heart or kidney lesion or grave constitutional disturbance when an operation would be extremely dangerous, is a deviation from the well established indications justifiable. The employment of radium to reduce a tumor larger than a three months' gestation is fraught with a certain degree of danger, neither should it be used in a tumor causing pressure and whose structure is purely fibroid or a dense hyaline or calcareous structure. It is granted that shrinkage of such tumors sometimes occurs, but with our present knowledge of distinct indication and contraindications the careless use of radium is not justified. Neither do we countenance its indiscriminate use to control uterine bleeding that is secondary to pyosalpinx or other adnexal disease. To clearly define our position therefore it may be stated that in our work the most satisfactory results were obtained in the treatment of one symptom only, namely hemorrhage, and we feel positive that radium used with care and clear discrimination has undoubted merit, acting almost as a specific and possessing the additional advantage of having almost negligible objections.

CONCLUSIONS

In the treatment of benign hemorrhage from the uterus the following observations are to be considered:

1. Radium should be used only in selected cases such as (a) myopathic bleeding of adolescence that does not respond to usual medical and hygienic measures; (b) myomata with bleeding as a symptom that are of small or moderate size and uncomplicated by adnexal disease; (c) menorrhagia of menopause.

2. The dosage depends upon (a) the age of the patient; (b) upon whether the function of child bearing is to be preserved or sacrificed.

3. Myomectomy in young women, and hysterectomy when the tumor is large or complicated should be done rather than treatment with radium.

4. Complications and unfavorable results are to be avoided only by a careful discriminating differential diagnosis.

5. All cases treated by radium should be carefully followed up for several years.

714 JENKINS ARCADE BUILDING.

THE PRESENT STATUS OF SURGERY IN THE TREATMENT OF FIBROMYOMATA UTERI*

By STEPHEN E. TRACY, M.D., F.A.C.S., PHILADELPHIA, PA.

THE status of any method of treatment is determined by the end results. The technic of myomectomy and of hysteromyomectomy has been so carefully and thoroughly worked out and the results both primary and secondary have been so uniformly satisfactory that we can scarcely hope for much improvement.

Other forms of treatment to secure recognition must be simpler in application, more conservative, or yield better results; if not in all cases, then in a certain type of case.

In the last five years much has been written on the treatment of these neoplasms by radiotherapy and especially by radium. Some authors make the claim that 60 per cent or even a higher percentage of these cases, as the surgeon sees them, can be successfully treated with radium.

In order to determine whether these sweeping statements are founded on facts, it will be necessary to consider the pathology of these tumors and of the neighboring structures and then to compare the results.

This discussion is limited to those neoplasms which produce symptoms and require treatment. The symptomless tumor requires no treatment, but should remain under observation.

It is a well-known fact that 30 per cent of patients with fibromyomata uteri, as the surgeon sees them, have either a degeneration of the tumor or a malignancy of the pelvic organs. The degenerations in the tumor are nearly twice as frequent in patients who are past the age of forty years and 90 per cent of the malignancies occur in women who are over this age. The vast majority of the malignancies in the uterus which contain fibromyomata, are found in the corpus and not in the cervix; just the reverse of what is found in women who do not have fibromyomata. This situation would seem to indicate that the fibromyomata by some method or means predispose or cause a malignancy to develop in the corpus.

The percentage of degenerations in the tumor and of the malignancies in the pelvic organs which are found will depend to some extent on the care with which the specimens are studied histologically.

Lesions of the abdominopelvic organs are so frequently associated

with fibromyomata uteri that they must be studied carefully when considering the treatment of these neoplasms, if we wish to eradicate all the pathology and relieve the patient of all symptoms. Anything less than this is a makeshift and is neither scientific nor satisfactory.

Associate lesions are found in 40 per cent of cases. When we add 40 per cent of associate abdominopelvic lesions and 30 per cent of degenerations and malignancies, we have 70 per cent of complicated cases. In my series the complicated cases were 77 per cent.

Of the patients subjected to operation in addition to the removal of the neoplasms, many were operated upon at the same time for lacerations, hemorrhoids, fistulae, diseased gall bladders, appendices and other lesions. In spite of all of these various complications, by surgery we relieve the patient of all symptoms in from 96 to 98 per cent of cases. The mortality from operation on patients with fibromyomata uteri, by good surgeons in well-equipped hospitals, is about 2 per cent. These operative cases include those with the various degenerations, the densely adherent tumors, the malignancies which coexist and all the serious associate conditions. If the surgical mortality in all cases as they come, is only 2 per cent, in simple uncomplicated cases, it would be practically *nil*. In other words, simple uncomplicated tumors such as are suitable for treatment by radium, can be treated by myomectomy with practically no mortality; complications which occur after treatment by radium, due to the impossibility of determining certain pathologic lesions, will be eliminated and "cooked tissue to await an uncertain future" will not be left in place. Polak states, "the increased blood pressure and nervous phenomena are more pronounced after radium than after operation."

With the improvements in technic which eliminate the possibility of hemorrhage or of a necrosis in the sutured area, the field of myomectomy has been greatly enlarged. Knowing that a menorrhagia or a metrorrhagia can be successfully controlled by radiotherapy, should it occur after a myomectomy, there is no doubt that the operation will be done more frequently in the future.

It is quite agreed by surgeons and radiotherapists that radium should not be used in the presence of malignancy if the case is operable. This is certainly true in carcinoma of the corpus uteri and of the ovary and it is debatable in early carcinoma of the cervix uteri, nor should radium be used in submucous or large pedunculated subserous tumors, in degenerated tumors, in calcified tumors, in tumors associated with lesions of the appendages; in tumors which produce symptoms from pressure and require quick relief, nor finally in tumors associated with gestation. Miller states, "that patients who complain of pain associated with fibromyoma, are usually not relieved of that symptom when treated with radium."

Who can diagnose all of these conditions by any method of examination? The surgeon certainly cannot. The pathologist sometimes overlooks a malignancy and the condition is not detected until the patient returns with a recurrence. The more competent roentgenologist will not treat these patients unless they have been examined by a gynecologist or by a surgeon. They realize the difficulty in diagnosis and pass the responsibility over to the surgeon. An early gestation in one corner of the uterus gives the organ an irregular contour and may be readily mistaken for a fibromyoma. The difficulty of a differential diagnosis between a gestation and a soft myoma can be attested by the humiliation at the operation table of even the most expert. An error in diagnosis may readily occur from a distended bladder or a loaded sigmoid. And again, fibromyomata are not infrequently diagnosed when they do not exist. That the radium enthusiasts cannot determine with any degree of accuracy what are simple uncomplicated cases is evidenced by the number of patients who subsequently require operative treatment, by those who develop complications and by an occasional fatality.

When we eliminate the patients under forty years of age and the complicated cases over forty years of age, there remain only 16 to 18 per cent of patients with simple uncomplicated tumors which make it apparent that the legitimate field for radiotherapy is decidedly limited.

Radiotherapists place especial emphasis on the production of amenorrhea, which is simply the elimination of one symptom. They talk about the shrinkage of the tumor in many cases, but most of them carefully avoid stating in what percentage the tumor disappears.

In Kelly's series the tumor had either disappeared or shrunk to an insignificant size in only 45 per cent of the cases. Miller states, "that the diminution in the tumor is usually more than 50 per cent; that the growth is frequently reduced to a negligible affair and often entirely disappears." Pfahler, in a series of 67 traced cases treated with x-rays, reports 75 per cent of absolute cures. While this series is not large, it indicates that he exercised excellent judgment in the selection of his patients and apparently limited his treatment to simple uncomplicated cases.

It is undoubtedly true that the bleeding can be controlled in almost every case by radiotherapy, but as Mayo states, "one cannot escape the conviction that in cases of myoma the use of radioactive substances is a most destructive method of treatment, nonoperative it is true, but certainly not conservative. In the majority if not in all of the cases in which rather large myomata disappear under their use, the patient loses the function of the ovaries, tubes and

uterus, although the nonfunctionating remnants are left in place to await an uncertain future.''

While this paper does not deal with myopathic hemorrhage, I believe that a patient at or near the menopause with an enlarged fibrous uterus, with menorrhagia or metrorrhagia, should be treated by radium rather than by surgery.

When we recall that 70 per cent of the cases of fibromyomata uteri are complicated, that in all of the patients subjected to operation not only are the tumors removed, but also the abdominopelvic pathology is eradicated and that from 96 to 98 per cent are cured of all symptoms, it is evident that surgery is the treatment of choice. Conservative myomectomy should be done in women under forty years; supravaginal, and when indicated, panhysterectomy in women past the age of forty years.

Radium undoubtedly has a field, limited though it is, in the treatment of these tumors. The pioneers in this work are to be commended for their effort and for their enthusiasm. Only by faith and experiment can the new be developed and progress made. This enthusiasm, however, in the best interest of the patient, must be tempered with sound judgment and applied by the Golden Rule.

Radium may be safely used in these cases as follows:

1. In simple uncomplicated, small or medium size tumors causing hemorrhage at the menopausal period.

2. In patients with menorrhagia or metrorrhagia after myomectomy.

3. In patients whose general health is so impaired from any cause that an operation would be attended with undue risk.

A broader application of radium or x-ray means that the best interest of the patient is not receiving sufficient consideration.

When we consider all of these factors it is evident that surgery is the treatment par excellence in the vast majority of patients with fibromyomata uteri which produce symptoms.

SUMMARY

1. Of all the patients who consult a surgeon for symptom-producing fibroids, 30 per cent have either degeneration of the tumor or malignancy of the pelvic organs.

2. Abdominopelvic pathology is found in 40 per cent of the cases.

3. Seventy per cent of these patients have complicated tumors.

In women past the age of forty years only 16 to 18 per cent have simple uncomplicated tumors.

4. It is impossible by any method of examination to determine which are simple uncomplicated tumors.

5. The treatment of choice in the vast majority of cases is myo-

mectomy for women under the age of forty years and hysterectomy in women past this age.

6. That radium has a definite though limited field of usefulness in the treatment of these neoplasms.

7. (a) That the use of radium should be restricted to small or medium-sized uncomplicated tumors at the menopausal period.

(b) To a patient with menorrhagia or metrorrhagia following myomectomy.

(c) In certain constitutional diseases in which surgery would be attended with unusual risk.

<div align="center">REFERENCES</div>

Kelly, Howard A.: Surg., Gynec. and Obst., xxvii, 402 and 409. *Mayo, Wm. J.:* Surg., Gynec. and Obst., April, 1922, xxxiv, No. 4, 250 and 252. *Miller, C. Jeff.:* Surg., Gynec. and Obst., May, 1922, xxiv, No. 5, 593 and 597. *Pfahler, Geo. E.:* Jour. Mich. State Med. Soc., August, 1918. *Polak, John Osborne:* Jour. Am. Med. Assn., May 27, 1922, lxxix, No. 21, 1658. *Tracy, Stephen E.:* Pennsylvania Med. Jour., 1922. *Tracy, Stephen E.:* Surg., Gynec. and Obst., March, 1908, 246 and 254. *Tracy, Stephen E.:* Jour. Am. Med. Assn., Oct. 21, 1916, lxvii, 1213 and 1216. *Tracy, Stephen E.:* Tr. Am. Assn. Obst. and Gyn., 1919, xxiii, 432 and 440.

1527 SPRUCE STREET.

THE PATHOLOGICAL REACTION OF TISSUE EXTRACT (CYTOST) LIBERATED IN PREGNANCY*

BY FENTON B. TURCK, M.D., NEW YORK, N. Y.

INTRODUCTION

IT has long been known to biologists that toxemia from disintegrating tissue occurs during pregnancy. This tissue toxemia also occurs to a lesser extent during the menstrual periods, adolescence, and the climacteric, but pregnancy in particular imposes an extra burden of tissue intoxication, due to the liberated poison of disintegrated cells. This poisons both the mother and fetus. *It is specific to the species.*

Not only has the specific tissue toxin of pregnancy long been identified, but the second and natural sequence of this, e.g., the specific antitoxin has been known. The immunity against this specific tissue toxin has been scientifically accomplished and practically applied. It should therefore, become an integral part of clinical practice just as it is a scientifically recognized biological function.

It is being further established among biologists that immunizing the mothers, confers hereditary protection. Guyer's[2] argument "that the

---

McEachern in a discussion on the Sheppard Towner Act signals the warning that "The medical profession must know that it has to get in line with changing conditions. Failing to do so, it loses the representative position it *should* occupy in society." (Rude)[1].

fact that animals can build antibodies against their own tissues when these become misplaced or injured," is significant in heredity as well as congenital conditions. Not only has the tissue toxin been identified, but the antitissue-toxin has been long produced in our experimental work (since 1903), and is illustrated in the protocols which follow.

Cats, dogs, mice, hens and other animals were used in these experiments. The comparison of the experimental tissue toxin antitoxin reaction with clinical experience, was made before the war by the writer, but during the war it was established on an unprecedented scale by the practical application of the principle. Our experiments show that only the tissue extract of the animal of the same species, caused the toxemia of pregnancy. The symptoms were vomiting, eclampsia, kidney disease, followed by abortion and death. On the other hand, the tissue extract of animals of other species failed to produce these effects.

The protocols will also show that sublethal or low concentration of the homologous tissue toxin, and at longer intervals, instead of causing the toxemia of pregnancy, produced an active immunity against the tissue toxin. It was also found that horses injected with human tissue toxin, produced an antitoxin. This antitoxin serum has been used to immunize mothers against tissue toxin of pregnancy just as we have immunized against tissue toxemia of shock from damaged tissue of wounds.*

There is not one tissue toxin produced by a bullet, another by an ax, a hammer or a burn, and another by a surgeon's knife. They all produce damaged tissue, autolysis and the tissue toxin of shock. Likewise, there is not one tissue toxin of autolysis from starvation, another of tissue autolysis from pregnancy, they all are the same tissue toxin, producing toxemia sickness and death, and depending on the degree of autolysis and concentration of the tissue toxin.

TISSUE TOXIN (CYTOST). OUTLINE OF PREVIOUS RESEARCHES

When an animal is prevented from utilizing its food supply, it must break down its own tissue (autolyze) to supply the caloric deficit. This mechanism which induces autolysis in total or partial starvation, is unknown. The tissue breakdown, termed autolysis, is a normal biological process, and the unknown products set free have been named "metabolites". The metabolites when accumulated in excess within the organism, as may occur in partial or total starvation, produce wellknown symptoms and pathology grouped under the term "toxemia of starvation."

When these metabolites are formed in excess from bodily exercise, the symptoms and pathology are classed as the "toxemia of fatigue." When from any wound or other tissue injury, these metabolites form in excess by autolysis, the symptoms and pathology called "shock,"

---

*A review of this work was recently published in the International Clinics,[15] 1922, Vol. 3, Series 32.

are expressed as the "toxemia of shock." When these metabolites form in excess from the autolysis during the period of pregnancy, the symptoms and pathology are mentioned in our literature as the "toxemia of pregnancy."

Extreme fatigue, effort syndrome, etc., are often the predominating symptoms common to all of these conditions, partial or total starvation (inanition), over exercise, overwork, shock from war wounds or surgical operations, and in certain phases of pregnancy. Bainbridge[3] states that these metabolic products are responsible for bringing about these various symptoms, especially the fatigue symptoms, as advanced by McDougall,[4] McKenzie,[5] and Hedwall.[6] Bainbridge[3] states "that the products are of two kinds, namely, lactic and carbonic acids and metabolites other than acids. There is no positive evidence to support the view that H-ion concentration produces harmful effects," because according to Bainbridge "the mechanism which regulates the reaction of the blood is so great that such an occurrence seems improbable," but Bainbridge insists there is evidence that metabolites other than acids. are productive of harmful effects. What is this "metabolite other than acid" which is so active in producing the harmful effects in toxemias of starvation, fatigue, shock and pregnancy? This ought to be made clear and decisive. It is only recently that the experimental evidences of the past 35 years have been universally accepted, e.g., that the tissue toxin itself is the poison responsible for these pathological changes. All the methods of extraction of tissue toxin from the tissues by water, heat, coagulation, and finally reduction by burning the tissue to ash, yield the same active principle, varying in concentration according to the method used. Because this active principle is not a manufactured product, but of and from the cell, it is named "cytost" from cytos, a cell. (See Author's Bibliography.)

BRIEF DISCUSSION OF PREVIOUS WORK

Imagination is the light that projects the experimental image beyond the dull plane of traditional belief and quickens the eye to see more and the mind to comprehend. Experimental research work on one subject often leads to the discovery of something more valuable than the original topic under investigation. This is what has happened in the research on the subject of traumatic or surgical shock. While investigating "shock produced by toxin" (1897)[13] it was found that many animals which did not die immediately passed into convulsions or presented symptoms as was expressed in 1896[14] "like snake poisoning" (1901).[15]*

Muscle extract from autolyzed muscle (1903)[17] and other tissue toxins,—polypeptides,—obtained from dilated stomachs injected into ani-

*Willson, P.,[7] draws the same analogy of "snake poisoning" in "toxemia of pregnancy." He states that "90 per cent of cases of utero placental hemorrhages show evidence of toxemia. This toxin is similar to 'hemorrhagin' in snake venom."

mals, were found to act much the same. Tissue poison and diphtheria poison seemed to produce similar lesions (1903)[16]. In all of these experiments with tissue toxin, symptoms of vomiting and convulsions occurred, and finally death. Liver, lung, kidney and gastrointestinal lesions, were found. It did not seem to make much difference whether the tissue toxin was extracted *in vitro* or liberated within the animal by some cauterizing agent, or autolysis took place of any tissue or organ, the symptoms and pathology were the same.

Acute, subacute and chronic diseases were produced, depending on the method of experiments.[12, 18] When pregnant animals were used, the tissue toxin produced always the identical symptoms and pathology. They were the same as we encountered in clinical practice of toxemia of pregnancy in animals and the same classical group of symptoms and pathology familiar to all obstetricians.

When abortions occurred, it was found the fetus showed similar lesions in the liver, kidney and upper alimentary tract as were found in the mother. If it was an acute reaction, simply splanchnic stasis was encountered. In chronic conditions the same process continued, only it lasted longer. Advanced liver, lung, kidney lesions, and lesions in the upper alimentary tract were found. This constantly occurring syndrome and pathology, linked up the toxemia of pregnancy with toxemia of shock and made it clear that the biological basis was the same. But how shall we bring to the minds of the clinicians the biological laboratory findings of 25 years? The facts and conclusions concerning the effect of tissue on the organism have been accepted by all biologists. The application of these scientific biological reactions in shock and its biological analogues, has been practically demonstrated in the war and unanimously accepted by biologists, physical chemists and surgeons at the Interallied Reunion of the Society of Biology[1] (Bull. de l'Académie de Médecine, Jan. 10, 1922, p. 31). We must view biology as based upon the cell and its activities, and medicine is but the application of the science of biology. There is not one cell for the biologist, another for the physical chemist, and another for the clinician, and therefore, practical medicine must follow the path made by biology and the new discoveries in physical chemistry. Our increased comprehension of the significance of the advance in biology, has not only altered our mode of thinking, but our method of action in the practice of medicine.[6]

EXPERIMENTAL TOXEMIA OF PREGNANCY

Toxemia of pregnancy is a very vague term. It has long been recognized that there is a toxin of some kind, hence the term "toxemia." There is the idea of an elaboration of a toxin from secretions, metabolic or generated from the fetus or maternal tissue, or what is often regarded as a retention of excretory products similar to uremic

retention products. This has all become very vague and hazy in the minds of obstetricians and gynecologists. Each writer volunteers his own opinion from clinical experience backed with some laboratory work that may support his theory. Thus some kind of focal infection is considered the source of the toxin of pregnancy, while others believe it is but the theory of "foreign protein" intoxication. First the expression "toxemia" implies a "blood poisoning". The word poison as used means some indefinite unrecognized product that circulates in the blood coming from some unknown source. This poison is viewed by some as a pharmacological product to be assayed by pharmacological methods. Kosmak[8] in his brochure* on the "Toxemia of Pregnancy," gives a scholarly review of these "many uncertainties" with which "the entire subject is surrounded." Ely[9] states that "the whole subject of toxemia of pregnancy is as yet in a chaotic state." As we have seen here [19, 20], "tissue toxin" is only a biological product that acts as a normal stimulus to life and causes cell division and metabolism (1921), (1922)[12]. It is not a "foreign protein" poison,—neither foreign nor protein. It is derived from homologous,—not foreign tissue,— and the protein is burned off to an ash. In other words, it is not a poison at all. This tissue substance which we have called "cytost," is in low concentration a stimulant to cell division and metabolism, and in high concentration it acts in excess of the normal on the splanchnic area (endodermal zone) and produces a certain definite reaction and death. Cytost is counterposed by an antibody called "anticytost" found in the blood serum.

We may repeat our conclusions of 1906[21], "from the large amount of experimental work on blood serum, by numerous investigators, we are able now to clothe our ideas of protective bodies in more technical and definite language. We may speak now of natural histogenic immunity, of hemolysins, of agglutinins, of precipitins, of cytotoxins, etc., and that we have here, not a question of local pathology, but of general blood pathology, of complement and amboceptor, of cytolysis and autocytolysis."

RECORD OF EXPERIMENTS

In the experimental work which follows, it is our endeavor to demonstrate by various types of experiments on various animals, the principle of the action of the specific tissue toxin known as cytost. Since one of the most important and significant applications of its activity is, as we have stated, one of the most vital factors in pregnancy, we have performed a number of experiments with relation to both mother and offspring during that most critical period.

---

*Kosmak[8] has given such a good bibliography on the toxemia of pregnancy, it will not be necessary to do more than refer to it.

Our experimental work is as follows:

1. A.   Autolysis,—forceful feeding, the rôle of extractives.
   B.   Fetal autolysis.—cytost, the product of autolysis.
2. Specificity of cytost.
3. Contact effect of cytost.
4. Breeding of mice with injections.
5. Injections,—toxemia of pregnancy.
6. Effect on egg-laying production of hens.

1. A. *Autolysis.*—Following is a table which is a condensation of a number of protocols showing the effect of the administration of extractives.[22, 23, 24]   Of especial interest is the effect on the offspring of pregnant dogs, in series 5.[24]   These experiments were carried out to determine the effect of feeding pregnant dogs with meat and meat extractives and meat freed of extractives with and without the addition of B. coli communis, noting the effect upon the offspring.   With those animals that were fed with extractives and B. coli, the offspring all died in periods of time ranging from one hour to two weeks.   One animal which died three weeks after birth developed an ulcer of the stomach and died of hemorrhage from that ulcer.

The other animals showed general degenerative changes in the tissues of all the organs; foci of autolysis without round-cell infiltration observed in stomach, liver, kidney and other organs.[24, 25]

TABLE I

PATHOLOGICAL EFFECT FROM FEEDING OF EXTRACTIVES

SERIES	ANIMAL	DIET	DURATION OF DIET	PATHOLOGY
1	Dogs			
	A	Extractives		Continuous diarrhea
	B	Extractives and B. coli	1 month	Diarrhea, loss of weight
	C	Ordinary diet + B. coli		Normal
	D	Meat free of extractives		"
2	Mice series			
	1	Ordinary meat in excess		Normal
	2	Meat extract		Diarrhea and death
	3	Meat freed of extractives		Grew fat
3	Mice and rats			
	1	Raw beef + B. coli	1 month	All died
	2	Beef extract + B. coli		
	3	Extract of free beef + B. coli		
4	Dogs			
	A	Meat extractives + B. coli meat diet	4 to 6 months	Died 81 days after feeding began
	B	Same diet		Ulcer of stomach
	C	" "		Duodenal ulcer
	D	" "		13 duodenal ulcers
5	Pregnant dogs	Extractives + B. coli		Offspring died in from 1 hour to 2 weeks

In former experiments,[26,27] the processes of digestion, absorption and assimilation were retarded by means of introduction of tannic acid, alcohol, silver nitrate, mustard oil,[28] and similar substances into the alimentary tract. We subsequently employed extractives[21] as more nearly approximating physiological conditions, since they are present in protein food. Their action was likewise to cause an arrest of the normal processes of digestion, absorption and assimilation and thus to induce inanition. This inanition induced a consequent breakdown of body cells with a liberation of cytost, depending in amount upon the degree to which the catabolic process was carried. This end result is shown in the above table, under the pathological results of extractive feeding. The extractives were the first link in the chain of the vicious cycle of starvation. When starvation is complete, the animal utilizes his own tissues in order to obtain sufficient calories to maintain himself. The tissues used are oxidized completely, whereas, in partial starvation, with tissue breakdown, but incomplete utilization, the tissue toxin which is liberated adds to the tissue toxin already existing in the organism, and thus produces a lethal factor.

In pregnancy, tissue breakdown can be seen from Table II to affect both mother and offspring. None of the puppies of the animals whose tissues had been poisoned by the liberation of homologous cytost, survived.

B. *The Autolysis of Fetal Animals.*—The rate of autolysis of the fetus was[29] observed under various conditions using strict aseptic precautions. Autolysis[30] appeared more rapid when the fetal animals were left in the uterus. In 150 animals the rate of autolysis and the degree of toxicity of the tissue toxin was studied specifically. Smears were made to determine by microscopic examination that autolysis had taken place. The tissue fluid that came from the autolyzed tissue (serum) was taken up and injected into animals. This caused death in every case. None of the animals injected lived longer than two days. The degree of dosage of tissue toxin was determined by comparative titres made with blood serum of the homologous animal and solutions of evaporated solid tissue. The animals receiving the injection of the homologous emulsion of tissue from the animal showed symptoms of acute venous dilatation of the splanchnic vessels, and this was apparently the cause of the sudden collapse and death. The actual toxicity of the autolized fetus was thus demonstrated.

2. *Specificity.*—We have demonstrated the specificity of cytost in a variety of ways. One of the most delicate of these is that of intraspinal injection.[19, 31]

Table III of a few comparative animal experiments establishes the fact that only homologous cytost will induce lesions of a definite character. In the spinal cord and fluid we have the most delicate indicator with which to demonstrate the highly specific character of

TABLE II

THE EFFECT OF FEEDING EXTRACTIVES ON PREGNANT DOGS

NUMBER	WEIGHT	DIET	TIME	OFFSPRING	POSTMORTEM
1	9.5 kg.	Fed with increasing cultures of B. coli communis in bouillon. Same diet continued for	3½ months 3 months	2 pups born, one died first day; other in two weeks	Second pup had small peptic ulcer. Ulcers in stomach and duodenum. Acute peritonitis
2	10.5 kg.	Fed during pregnancy with B. coli bouillon cultures. Feeding intermitted six weeks then resumed for 2 months when death occurred.	2 months	2 pups born, one died same day; other the next day	Duodenal ulcer
3	8 kg.	Large quantities of B. coli bouillon cultures (1000-2000 c.c.) for one week. Discontinued. Resumed	1 week 2 months 3½ months		2 deep ulcers in stomach

tissue ash.   We had positive results with homologous cytost, and nega-
tive results with heterogenous cytost.

TABLE III

INTRASPINAL INJECTIONS TO INDUCE PARALYSIS

CAT NO.	CYTOST USED	AMOUNT AND POINT OF INJECTION	RESULTS	REMARKS
149	Homologous	1 c.c.; last Lumbar space	Complete shock for 30 min.; complete paralysis of hindquarters.	Death in 8 days.
155	Homologous	1 c.c.; last Lumbar space	Complete shock; coma.	Death in 12 hours.
158	Homologous	¼ c.c.; last Lumbar space	Slight shock; complete paralysis hindquarters.	Death in 7 days.
192	Homologous	¼ c.c.; last Lumbar space	Shock; delirium; marked inco-ordination.	Used for another experiment.
150	Human	1 c.c.; last Lumbar space	Slight delirium; no further symptoms.	Made uneventful recovery.
157	Horse	1 c.c.; last Lumbar space	None.	Apparently normal after recovery from ether.
161	Lion	1 c.c.; last Lumbar space	Slight shock.	Uneventful recovery.
180	Lion	¼ c.c.; last Lumbar space	Marked delirium.	Walking normally 30 min. after injection.

3. *Contact Effect.*—Animals were exposed to contact with homol-
ogous cytost by 1. Insufflation, 2. Aspiration from paws covered with
cytost, 3. Contact with cages smeared with cytost.

Following is a description of the method employed in insufflation.[32]

Fresh normal cat's lung tissue was autolyzed in a sterile chamber filled with
chloroform vapor for 48 hours.   No bacteria were found, microscopically or by cul-
ture, in the autolyzed tissue products, which gave a strong biuret reaction.   A spe-
cial tube attached to a respiratory indicator was inserted into the cat's trachea and
0.5-1 gram emulsion of this sterile autolyzed lung tissue was insufflated into the
trachea.   By the animal's increased inspiration a small part of this lung tissue
product was aspirated into the finer bronchi and caused death of the animal within
four minutes.   In other animals typical pneumonia occurred of both bronchial and
lobar forms.   In cases of immediate death the tissue changes in the lungs were focal
in type, with disseminated hemorrhagic areas, while the entire lung was hyperemic;
in some cases it was soaked with blood.

From Table IV it is evident that insufflation of the bronchial tube
with homologous cytost produces pneumonia followed by death.   That
this is due to the action of cytost as a tissue toxin may be proved by
the fact that insufflation with other substances did not result in
respiratory disease or death. [33], [34], [32].

The method by which the autolyzed lung tissue may be carried into
the trachea under more natural conditions is shown by the following
experiments.   Cat's paws covered with thin paste of cat autolyzed
lung tissue.   The cat lung tissue was autolyzed under the same sterile
conditions as in the previous experiments.

TABLE IV

Cats Insufflated with Autolyzed Cat Lung Tissue

CAT NO.	TIME OF DEATH AFTER INSUFFLATION	TIME OF EXAMINATION MADE UNDER ANESTHESIA	PNEUMONIC FINDINGS ON IMMEDIATE POSTMORTEM		REMARKS
			BRONCHIAL TYPE	LOBAR TYPE	
P 1	4 min.	....	....	+	Intense congestion of both lungs.
P 2	3 min.	....	+	....	Lungs appeared soaked in blood.
P 3	5 min.	....	+	....	Liver lobes involved and lungs congested.
P 4	10 hrs.	....		+	Sneezing. Râles.
P 5	....	45 hrs.	+	....	Râles.
P 6	24 hrs.	....	+	....	Coughing.
P 7	Shock	25 min.	+	....	Resection of lungs.
P 8	15 min.	....	+	....	
P 9	5 hrs.	....	+	....	Profound symptoms from the beginning.
P 10	10 days	....		±	Pleuritic effusion.
P 11	8 days	....		+	Coughing and sneezing.
P 12	....	3 days	±	....	Coughing. Râles.
P 13	3 min.	....	±	....	
P 14	2 hrs.	....	±	....	
P 15	36 hrs.	....	+	....	
P 16	4 min.	....		+	Intense engorgement.
P 17	5 min.	....	±	....	Reaction in both lungs.
P 18	Shock	5 min.	+	....	Reaction in both lungs with hemorrhages.

A group of ten cats was selected and examined to exclude any respiratory disturbance, and then placed in a large cage. The front paws of five of these animals were coated with a thin paste of the autolyzed cat lung tissue. The animals were tagged and placed back in the cage with the other five cats that had not had the application of "lung paste". Within two hours several of the cats began to sniffle and sneeze. Within twelve hours all the cats, those that had had their paws coated and the others in the same cage that had not had the application of paste, had symptoms of involvement of the lungs. Eight of these cats died from pneumonia within 48 hours to one week after the application of the lung paste. Some of the animals showed extensive respiratory pathological conditions. They also showed nasal discharge, eyes reddened, conjunctival discharge, and extensive râles over both lungs. The temperature at first dropped and later rose, but the temperature records were no guide to the degree of lung involvement.

The postmortem findings were similar in character to those in which the lung tissue was insufflated into the trachea. In some of these animals the lungs showed acute hemorrhagic pneumonitis. In others there was hepatization of lobar type with dense hardened nodules. In others again both types were shown in the same lung.

In the following groups of experiments kittens were born or placed in cages contaminated with cat cytost.

Group I consists of kittens born by nonimmunized (normal) mothers that were brought into the laboratory and placed in cages contaminated with cytost.

Group II consists of kittens that were born of actively immunized mothers in these contaminated cages.

Group No. I

Kittens from nonimmunized (normal) mothers unprotected by anticytost injections.

AGE	DEATH IN
8 weeks	12 days
4 weeks	10 days
4 weeks	12 days
4 weeks	11 days

Kittens from nonimmunized (normal) mothers that were partially protected by anticytost injections.

AGE	DEATH IN
8 weeks	17 days
4 weeks	25 days
4 weeks	32 days

Group No. II

Kittens from actively immunized mothers unprotected by anticytost injections.

AGE	DEATH IN
Born in cage	8 weeks
Born in cage	57 days
Born in cage	18 days
Born in cage	32 days

Kittens from actively immunized mothers that were partially protected by anticytost injections.

AGE	DEATH IN
Born in cage	6 months
Born in cage	4 months, 11 days
Born in cage	1 month
Born in cage	11 weeks
Born in cage	8 weeks

Discussion.—Here we have quite conclusive evidence of transmitted immunity. It is interesting to note that the kittens from nonimmunized (normal) mothers, that received partial protection, succumbed more quickly to the effects of homologous cytost than did the kittens from immunized mothers, with "hereditary" immunity, that received no protection. It is also interesting to note that the kittens born by immunized mothers, and receiving partial protection of anticytost, lived a much longer period.

The average time of death of any kitten or cat exposed to homologous cytost contact, is from ten to twenty days, when unprotected by anticytost injections.

Those kittens, subjected to tissue toxin that are partially protected by anticytost so they can continue to live for from four to six months, become excellent examples of premature senescence. Growth is usually arrested at about two months of age, and various changes appear. The front legs become bowed, and the hind legs drop at the back (rachitis). Ventral curvature of the spine, unthrifty (staring) coat, as well as the slow, deliberate motion of an old animal. The facial expression becomes typical of that of a tired and dejected person and it ceases to play as kittens are wont to do. Well-marked lame-

ness in some articulations is evidenced, and at times all four limbs are involved. On postmortem we find all the characteristic tissue changes of decreased metabolism. The bones show definite change in structure, (rachitis, osteomalacia, etc.), as well as marked articular changes, (necrosis, exostosis and ankylosis), due to the stasis in the bone marrow and its subsequent cytost reaction, chronic fibrous pneumonia, chronic nephritis.

4. *The Breeding of Mice with Cytost Injection.*—A series of cytost injections was carried out on a number of mice under most favorable conditions. From the following grouping of the experimental animals, it is obvious that we found that injections of high concentrations of homologous cytost produced death, as in the case of other animals, while injections of low concentrations of cytost, repeated at regular intervals produced immunization of mother and offspring, so that the mortality is very appreciably reduced, in comparison to control groups; while injections of high or low concentrations of heterogenous cytost failed to produce any effect at all.

GROUPING OF THE EXPERIMENTS

1st Group: Male and females injected subcutaneously with high concentration, ½
Cage 1: c.c. cytost,—10 mice.
    Result: All the mice died in 12 to 48 hours.
2d Group: 50 mice in 4 cages,—males and females injected with medium concentration of cytost, ¼ c.c. once a week or 10 days. The death rate was considerably increased in both males and females. The usual birth rate prevailed, but the offspring showed a high mortality. Within 2 months 95 per cent of the offspring died and 80 per cent of the adult animals. Others that lived through the experimental period suffered from ''metabolic disorders.''
3d Group: Dilution 1/40, (0.25 c.c.) ¼ c.c. of homologous cytost. Thirty mice, usual proportion male to females. Six injections ten days apart. Mortality was reduced in mothers to 3 per cent, and of the offspring to 5 per cent.
4th Group: Injection of diluted cytost 0.06 c.c.
    10 mice.—Injections for two months once weekly.
    Result: No deaths.
Group 5-6: Actively and passively immunized mice by injection of anticytost and cytost in low (dilute) concentrations. Results show a very high degree of immunity of both mother and offspring. These are being carried through for several generations for special report on the question of heredity, and referred to here as corroborative, in connection with the other immunizing experiments reported.

5. *Toxemia of Pregnancy.* A further series of experiments has been carried on in pregnant cats which have been injected with cytost. In all cases where the cytost was specific, the injection, if high in concentration resulted in abortion, with vomiting and shock, none of the kittens survived, but in the surviving cats, there was produced nephritis, either chronic or acute. The table gives a condensed but clear

TABLE V

NAUSEA, KIDNEY DISEASE AND ECLAMPSIA IN PREGNANCY

NUMBER	CASE NUMBERS	DESCRIPTION	INJECTIONS	REACTIONS	PATHOLOGY
1 and 2	111 & 112	Females	Placental tissue Intraperitoneal	Vomiting Anorexia	1. Nephritis and gastric ulcer 2. Became immune
5 and 6	289 & 288	Pregnant females	High concentration Cat cytost Intraperitoneal	Abortion Kittens dead in utero	5. Nephritis, gastric dilatation 6. ....
7, 8, 9	274, 256, 299	Pregnant females	Cat cytost 1% Intraperitoneal	Vomiting, shock Anorexia Abortion. Kittens dead in utero	Chronic nephritis
CONTROLS					
12, 13, 14	313, 314, 315	Pregnant females	Horse, beef and lion cytost 1%	No vomiting No abortion	Normal
2, 3, 5, 7		Kitten fetuses	Mothers injected with cat cytost	Dead in utero	Glomerulitis and acute nephritis

and conclusive evidence of the toxic effect of cytost in the toxemia of pregnancy.

6. *Effect on Egg-laying Production of Hens.*—In a series of experiments carried out on chickens, in which one flock of ten pullets was injected with low concentrations of homologous cytost and another with a medium concentration, it may be seen from Fig. 1 that egg production in flock A was very greatly in advance of that of the control flock; while in flock B, egg production fell markedly, and the hens manifested the symptoms of toxemia. The results show very definitely that cytost in low concentration stimulates cell mitosis and metabolism while in medium concentration, it causes tissue catabolism and breakdown. Following is the condensed result of the experiment.
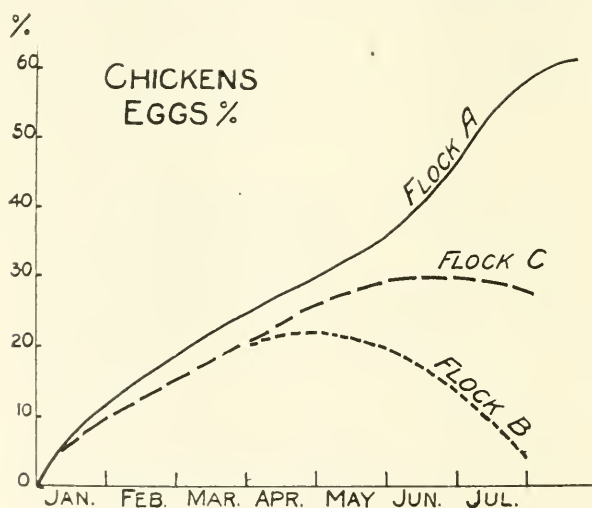
Fig. 1.

Flock "A": Continued to show improvement in egg yield and general metabolism over the control to the end of the experiments, e. g., 3 months and 24 days after the course of 4 injections had stopped; the actively immunized pullets were yielding 2 to 3 times the percentage of control pullets.

Flock "B": Twenty-five (25) pullets continued to show a persistent decline as the concentration or dosage of cytost was higher and the injections were kept up to the end. This as in all our experiments overcame the natural immunity and lowered resistance and caused retrograde metabolism.

CONCLUSION

When taken in conjunction with the hundreds of other animal experiments of a similar character, we came to the conclusions that we have demonstrated that low concentration of homologous cytost stimulated cell mitosis and metabolism.[19, 20] Further, that it directly af-

fects germ plasma cell and thus determines congenital conditions and heredity.

That high concentration of homologous cytost produces the opposite or retrograde effect on the cell causing degeneration metabolism on the germ plasma cell.

This explains the degenerating effect we obtained on the mother and the offspring in all our experiments.

GENERAL DISCUSSION AND CLINICAL APPLICATION

An able obstetrician, Patrick, in 1902 (Trans. Tri-State Med. Soc.) in a symposium on obstetrics[10] made the complaint "that not only in individual instances but whole sections or districts can be cited where obstetrical work is performed after the manner of thirty years ago", and after calling attention to the improved care given to the mother, concluded that "Loss by death and bitter experience, not the profession has wrought this change" (ibid., p. 56).[10] In the writer's discussion at that time (ibid., p. 67),[10] it was deplored "that the expectant plan of treatment is now generally adopted". The conclusion of Patrick at that time (ibid., p. 55)[10] is reiterated in modern literature. "The public has been made alive to altered conditions in other departments, they can also be made to grasp this need and we can have done with the unreasonable and unscientific hypothesis that because a woman does not die during confinement, and that as child birth is a physiological process, therefore, she is all right". The pathological condition was tersely expressed by Ries (ibid., p. 66)[11]: "Here is the surface—the endometrium, on top of it, the dead sloughing tissue", but he despairingly concludes that this knowledge "will only become thoroughly useful when there is a penalty imposed on forgetting".

During the war it was recognized that damaged tissue from wounds became at once "dead sloughing tissue" and in place of the old "expectant" plan, the damaged tissue was removed (debridement) and toxemia of shock greatly diminished. A similar plan is advised in the toxemia of pregnancy, in which it is suggested that the fetus be removed at the onset of eclampsia; as science, however, develops better knowledge of the causes of toxemia of pregnancy, it is hoped that a less drastic procedure may be resorted to in the method of immunization, rather than the very strenuous method of "plucking out the offending member."

To sum up briefly, care of the mother and offspring during parturition and after birth, is not enough. The profession is coming to see that the production of optimum conditions for mother and offspring during the nine months of gestation is not to be considered as lightly as it has been in the past.

The environmental conditions of the fetus may be more potent at

the outset than the factors of heredity, and infant damnation may occur *in utero* rather than after birth, from the operation of conditions which mar life hopelessly at the outset.

It is recognized that the cause of these pathological conditions is a toxemia due to the absorption of the toxins liberated by mother and fetus and reabsorbed into the blood stream, and as in the case of other circulating poisons, the solution of the problem is the production of other substances in the blood stream which will render these toxins harmless. This is the theory underlying the activity of cytost, and it is a pragmatic one, for it *works*. As we have demonstrated from our protocols, immunization to the tissue-toxins of the individual may be produced in varying quantitative degree through the liberation of the substance cytost in the individual. This principle is operative in wounds, starvation, on any condition in which the products of damaged tissue can get into the circulation,—and it is of especial importance in pregnancy.

The treatment of the toxemia of pregnancy by immunization of the mother before and during pregnancy not only insures her protection but determines the fate of the offspring whose future is dependent upon the environmental conditions of intrauterine life. Consideration of the problem should therefore be of prime importance to every physician and surgeon, particularly to those whose practice deals with women and children.

REFERENCES

[1]Rude, Anne E.: Jour. Am. Med. Assn., Sept. 16, 1922, lxxix, No. 12.
    McEachern: Discussion, Jour. Am. Med. Assn., Sept. 16, 1922, lxxix, No. 12, p. 963.
[2]Guyer, M. F.: Jour. Exper. Zool., February, 1920, xxxv, No. 2.
[3]Bainbridge, F. A.: Physiology of Muscular Exercise, 1919, p. 179.
[4]MacDougall, W.: Rept. British Med. Assn., 1908, p. 479.
[5]Mackenzie, James: Diseases of the Heart, (H. Frowd), ed. 3, 1913.
[6]Hedvall, B.: Skand. Arch. f. Physiol., 1915, xxxii, 115.
[7]Willson, P.: Utero Placental Apoplexy in Accidental Hemorrhage, Surg., Gynec. and Obst., January, 1922.
[8]Kosmak, Geo. W.: The Toxemias of Pregnancy, 1922, D. Appleton & Co.
[9]Ely, Frank: Memory Defects of Korsakoff Type Observed in Multiple Neuritis following Toxemia of Pregnancy, Illinois Med. Jour., October, 1922, xlii, No. 4, p. 264.
[10]Patrick, F.: Trans. Tri-State Med. Soc., 1902, p. 153.
[11]Ries, Emil: Ibid., p. 66.
[12]Turck, F. B.: Shock and Fatigue with Pulmonary Changes, International Clinics, 32d Series, 1922, iii, pp. 73-117.
[13]— Jour. Am. Med. Assn., 1897, p. 1160.
[14]— Toxins of the Stomach, New York Med. Jour., Feb. 22, 1896.
[15]— Shock in Abdominal Operations, Tercer Congreso Medico, Pan-Americano, Havana, Cuba, February, 1901, pp. 234-5.
[16]— Trans. Chic. Path. Soc. 1903, pp. 363-4.
[17]— Med. Standard, December, 1903 (Proc. Am. Gastro-Ent. Assn., May, 1903).
[18]— Kidney Lesions Resulting from Tissue Toxins, 21st Session, Association Francaise d'Urologie, 1921, pp. 428-449.
[19]— Med. Record, July 2, 1921.
[20]— Med. Record, Oct. 22, 1921, pp. 705-8.

21— Trans. Intl. Med. Cong., 1906, Jour. Am. Med. Assn., June, 1906, xlvi, pp. 1753-63.
22— Med. Exam. and Pract., New York, August, 1907, pp. 240-247.
23— Jour. Med. Research, Nov. 12, 1907, xvii, No. 4.
24— Trans. (33d Annual Meeting) Oregon State Med. Assn., July 12, 1907, Port-land, Oregon.
25— Med. Exam. and Pract., August, 1907, pp. 240-48.
26— Atti. del' XI, Congr. Med. Intern., iii, Med. Int., Rome, 1894.
27— Med. News, Apr. 4, 1896.
28— New York Med. Jour., Oct. 25, 1902.
29— Zur Aetiologie und Pathologie des runden Magen und Duodenal-Geschwüres Sec. 3, Int'l. Med. Cong., Budapest, 1909.
30— Ztschr. f. Exper. Path. u. Therap., 7 Bund., Literature, 1910.
31— Wisconsin Med. Jour., November, 1921, xx, No. 6.
32— Med. Record, May 3, 1919.
33— International Clinics, iv, 29th Series, 1919.
34— The Roll of Cell Necrosis and Bacteria Invasion in Surgery, Med. Record, Mar. 27, 1919.
35— Shock and Fatigue with Pulmonary Changes, Internat. Clinics, iii, Series 32, 1922, 73-117.

14 East Fifty-third Street.

DOES MENSTRUATION INFLUENCE BLOOD CONCENTRATION?

By MARGARET TYLER, M.D., AND FRANK P. UNDERHILL, PH.D.,
NEW HAVEN, CONN.

From the Laboratories of Obstetrics and Gynecology, and Pharmacology and Toxicology, School of Medicine, Yale University, New Haven.

THE present study was undertaken in order to determine whether there is any change in the percentage of hemoglobin during the menstrual period of normal women. The occurrence of such a change was suggested in some recent work on the hemoglobin of two women who had been severely burned and who had shown rather marked blood concentration as a result of the burns. When these two women menstruated, the blood concentration previously having become normal, both showed a striking rise in hemoglobin. In reviewing the literature on the subject, we were able to find very scanty material relating to hemoglobin during menstruation. Pozzi,[1] in 1899, reported that the percentage in whole blood was low just before the period, but normal during the period, and this finding led him to the conclusion that the fall in hemoglobin was due not to loss of blood but to some unknown and profound metabolic change. On the other hand, Sfameni[2] reports a rise in red blood corpuscles before the period with a fall during the period.

The present determinations were made upon eleven healthy women and comprise twenty-five menstrual periods. Hemoglobin was determined by the Cohen-Smith method which gives higher results than do hemoglobinometers usually employed. Duplicate determinations were made and the readings were discarded if there was a greater

difference than 5 per cent between the final values. Six readings
out of a total of 283 were discarded for this reason. Therefore, be-
cause duplicate samples are not always read exactly the same and
even after much practice may vary a few degrees, too much impor-
tance should not be placed upon slight daily variations in hemoglobin.
In interpreting the curves we are interested in discovering any con-
stantly recurring fall or rise during the menstrual cycle, also whether
during menstruation the hemoglobin shows greater daily variations
than at other times. Samples of blood were taken at intervals of 2
to 7 days during the intermenstrual period, every day during the
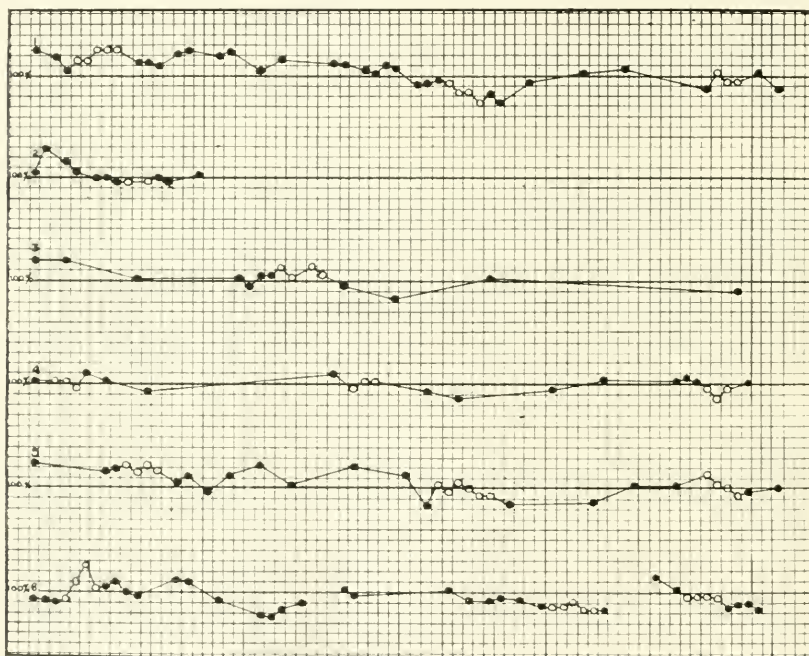
Fig. 1.—Hemoglobin in patients with normal menstruation.

In this and the succeeding figures hemoglobin readings during menstruation are shown by
a circle, at other times by a solid black spot. The heavy horizontal lines represent 100 per
cent hemoglobin. Each small horizontal division is one day. Each vertical division represents
5 per cent hemoglobin.

The numbers 1 to 11 refer to the patients studied.

period and also for several days before the period in those cases in
which its onset could be accurately predicted.

Normal Menstrual Periods (Fig. 1).—Six women were studied during
a total of fourteen normal periods. Some of these patients show an al-
most constant value for hemoglobin before, during and after the period,
as Case No. 4, whose readings are at no time more than 7 per cent below
and 6 per cent above her average value. Others, as Case No. 1, show
a frequent daily variation as great in the intermenstrual interval as

during the period, but there is no rise or fall occurring at the same time in each cycle.

Excessive Bleeding (Fig. 2).—Patients Nos. 7 and 8 had very free bleeding but slight pain. Case No. 7 showed persistently a low hemoglobin; usually the value ranged between 70 and 80 per cent. During one period there was a rise of 14 per cent, but a similar rise had occurred a short time before the period and, therefore, the rise during
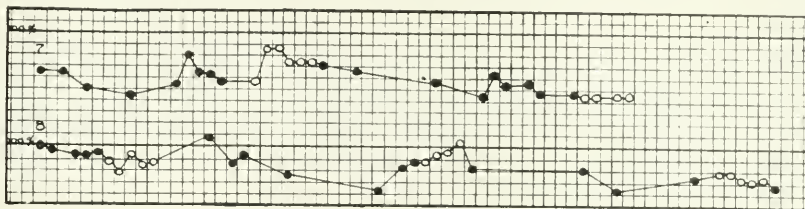
Fig. 2.—Hemoglobin in patients with excessive loss of blood during menstruation.

menstruation is of no moment. This patient's second period showed no change in the percentage of hemoglobin. Case No. 8 showed a slight fall in hemoglobin during one of her periods, but here again during an intermenstrual period there is a greater fall. If there were a constant fall in hemoglobin, we should expect it to be present in these subjects, since the blood loss was greatest in their cases.

Dysmenorrhea (Fig. 3).—Cases Nos. 9, 10 and 11 suffered during the first and second days from rather severe dysmenorrhea, which was
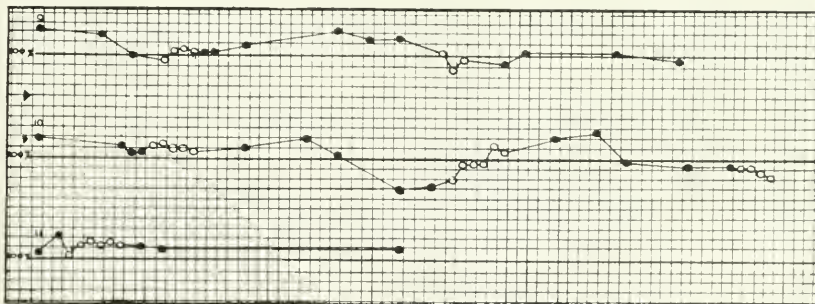
Fig. 3.—Hemoglobin in patients with dysmenorrhea.

associated with abdominal pain and occasional vomiting or headache. The greatest excursion shown by Case No. 9 during her most painful period is 5 per cent. Case No. 10 shows no constant change in either of her three periods (the fall before the middle period is perhaps explained by a change in pipettes and shows the importance of always using the same pipette). Patient No. 11 also varies from her intermenstrual average of 105 per cent by only 4 per cent during the menstrual period she was under observation.

Our present method of hemoglobin estimation fails to show, we believe, a constant variation in the hemoglobin which is characteristic of any one phase of the menstrual cycle. During some periods the hemoglobin rises slightly while during others it falls. We cannot relate the change to any symptom such as headache with which a rise in hemoglobin has been associated by some authors.

The uniformity of hemoglobin percentage during menstruation might be predicted for the blood loss is certainly insufficient to cause a measurable decrease in hemoglobin. Recent studies during menstruation show a normal basal metabolism; fatigue from measured work is as quickly recovered from as at other times.[3] The fact that there is no change in hemoglobin content and therefore in blood concentration during menstruation is in accord with our present knowledge of the physiology of this function.

REFERENCES

(1) *Pozzi:* Quoted by Stickel and Zandek, Ztschr. f. Geburtsh. u. Gynäk., 1921, iii. (2) *Sfameni:* Quoted by Stickel and Zandek, Ztschr. f. Geburtsh. u. Gynäk., 1921, iii. (3) *Wittshire, Marion O. P.:* Lancet, Aug. 20, 1921, no. viii, vol. ii, pp 388-389.

SPONTANEOUS RUPTURE OF THE BODY OF THE UTERUS DURING PREGNANCY*

By Howard F. Kane, A.B., M.D., F.A.C.S., Washington, D. C.

THIS paper is presented in order to place on record a case of spontaneous rupture of the body of the uterus during pregnancy and to call attention to some of the etiologic factors in this complication. Obstetric literature abounds in reports of cases of rupture of the uterus during labor, but spontaneous rupture before the onset of labor is an infrequent occurrence.

Mercier, in 1899, collected 28 cases and discussed the subject fully. In 1903, Baisch published a study of rupture of the uterus with references to 79 cases. His collection, however, includes interstitial pregnancy, rupture after cesarean section, pregnancy complicated by uterine new-growths, bicornate uteri, etc. Only nine fall into the class of cases in which there is no gross anatomical abnormality as a cause. Since then probably 25 isolated cases have been reported.

In reading the descriptions of the cases, one is struck by their similarity in regard to previous history, clinical picture, pathologic findings, and, too frequently, in result. The fact that almost none of the cases were correctly diagnosed before operation or autopsy makes it particularly desirable that each case encountered should be reported

---

*Presented at the Washington Medical and Surgical Society, November 22, 1920.

in detail, with emphasis on the important points. Although the case to be reported in this communication was incorrectly diagnosed before the abdomen was opened, it seems, in retrospect, to have presented a fairly clear picture of the condition.

In many of the cases reported, the diagnosis was ruptured ectopic pregnancy, ileus, appendiceal abscess, or other acute abdominal condition which is accompanied by shock. The saving point, however, is that surgical interference is clearly indicated and the true nature of the trouble is soon learned.

The mortality, maternal and fetal, in cases of rupture of the uterus, is appallingly high. In the 28 cases reported by Mercier, 23 died. It should be noted, however, that several of the cases in his series occurred in the pre-aseptic era of surgery. A larger number of the more recent cases were saved, but at best the maternal mortality is well over 50 per cent. The fetal mortality is practically 100 per cent. In a few instances it was reported that the fetus moved and breathed, but never did it live more than a few hours. That rupture of the uterus does not always cause immediate death of the fetus is shown by the reports of Leopold and Henrotin. In each of these cases the fetus was expelled into the abdominal cavity and underwent a certain amount of development, as the placenta remained attached to the uterine wall.

The chief predisposing cause of spontaneous rupture of the body of the uterus is multiparity. This is due both to hyaline degeneration of the uterine walls as a result of repeated pregnancies, and to the fact that many of these patients have been subjected to intrauterine manipulations in the course of former labors. This is one of the points which should be stressed. In nearly every case the history states that there had previously occurred abortions, stillbirths, malpresentations, or other abnormalities. In a significant number, the uterus had been curetted for retained secundines. Occasionally an intrauterine douche is mentioned, and in several instances manual extraction of the placenta had been resorted to.

Some of the authors consider the presence of scar tissue following curettage or manual extraction of the placenta to be the cause of subsequent weakness of the uterine wall. From a study of the histories and pathologic sections of those cases which have been fully reported, however, it seems more probable that the damage to the myometrium is the result of mild infections which have followed those procedures. The fact that rupture has occurred after intrauterine douches and versions following which there had been continued rise of temperature, strengthens the theory that infection rather than trauma is responsible for the friable condition of the uterine wall.

Infantilism has been found to be present in practically every case

of rupture in a primipara. Sometimes this is accompanied by under-development of the tubes and ovaries, but more often there is a condition of extreme thinness of the uterine musculature. Baisch speaks of these uteri as being "paper-thin." These cases are in the minority and of course little can be done toward their prevention.

In some cases indirect trauma has been given as the immediate cause of rupture. The patients have walked or ridden long distances just before the accident. Some have had falls or merely stumbled. One, reported by Armytage, had been straining at stool. In many of the reports, however, there is no record of previous trauma.

The usual pathology has been briefly mentioned in the preceding paragraphs. It consists principally of hyaline degeneration of the uterine muscle in cases of high multiparity; extensive round-cell infiltration and extreme friability in patients with histories of previous uterine invasion; and in underdevelopment of the uterus and adnexa in the occasional primipara. In one or two instances exceptional degrees of infiltration by decidual cells have been noted, but usually in conjunction with one of the above-mentioned conditions.

The site of the rupture varies. It has been found in the anterior and posterior walls, at the fundus both anteroposteriorly and transversely, near each cornu, and in one case, along the right border. It is usually a linear tear, but once or twice it has been found to be a round opening. In McPherson's case the rent was triangular.

Enormous hemorrhage has been encountered in most cases, and internal bleeding has been the usual indication for operation. H. L. Read, however, reported a case of rupture at the fifth month, in which the hemorrhage, while giving rise to symptoms, was not sufficient to cause the attending physician to do more than put the patient to bed. At the end of a month she was able to do her housework. Two months later she was sent to Read, who found a large rent in the posterior wall of the uterus which had been closed by adherent bowel.

In treating rupture of the body of the uterus, a few operators have sutured the rents as in ordinary cesarean sections. Nearly all have felt that supravaginal hysterectomy was indicated. In view of the pathologic findings it would seem that in most cases the radical operation is the proper procedure. Occasionally a case has been treated by simply packing the uterus, but probably the ruptures in those instances were not at all extensive.

CASE REPORT

Mrs. R. V. C. was seen September 8, 1920, in consultation with Dr. S. L. Battles. The patient, 19 years old, gave a history of having been curetted following an incomplete abortion in 1918. She stated that she had a high fever for three weeks after the operation, so infection may be inferred.

She was six months pregnant when seen by us, and had had an apparently nor-

mal pregnancy. On September 4, 1920, after a motor trip of several hours, she experienced a sudden sharp pain in the right lower quadrant of the abdomen. Several times during the last few years she had had attacks similar to this but not so severe. She had been told by the physicians who attended her during these attacks that they were due to appendicitis, but she had each time refused operation.

Since the onset of the pain she had felt no fetal movements. The pain was constant and had become more severe. Her bowels had not moved for two days, and for two days she had vomited frequently. There had never been intermittent pains suggesting labor. She was seen late at night, September 7, by Dr. Battles, and an enema ordered by him resulted in a large bowel movement.

The patient was a young white woman, well nourished but very pale. Lips and conjunctivae pale pink. Pulse 110, of good volume. Temperature 101° F. Leucocytes 23,000. Upper half of abdomen distended and tympanitic; all below umbilicus, of board-like rigidity and extremely tender. Maximum tenderness was directly over McBurney's point. An intraabdominal tumor reached to the umbilicus but could not be well mapped out on account of rigidity and tenderness. No fetal heart sounds or fetal movements could be found.

Vaginal Examination. Small, soft cervix, high in the pelvis, at first suggesting abdominal pregnancy. By forcing a finger into the cervical canal as far as the internal os, one pole of the fetus could be touched but not identified.

Diagnosis.—On account of the site of the initial pain and maximum tenderness, the vomiting and the history of attacks of appendicitis, a diagnosis was made of appendiceal abscess with dead fetus. Internal hemorrhage was not considered probable on account of the comparative slowness of the pulse and the five-day duration of the acute symptoms.

Operation.—A laparotomy was performed two and one-half hours after the patient was first seen. The abdominal cavity was found to be full of blood and clots. After as much blood as possible had been removed, the uterus was found to be torn from the fundus to just above the internal os in the midline of the posterior wall. About one half of the placenta and three inches of cord extruded through the rent and the head of the fetus was just within the opening. The fimbriated ends of both tubes were bound by adhesions to the bottom of the culdesac, and the right ovary was embedded in dense adhesions. After removal of the placenta and fetus there was practically no bleeding.

The uterus was amputated above the cervix, and both tubes, with the right ovary were removed. On account of the poor condition of the patient the appendix was not examined. The peritoneum was closed with a continuous suture of catgut, and the other layers were brought together with through and through sutures of purple thread. Salt solution was given under the breasts throughout the operation.

Postoperative Notes.—The patient was put to bed, external heat applied, and an enema of salt solution and coffee was given. Morphine sulphate, gr. ¼ was administered hypodermically, and as soon as the patient reacted proctoclysis was started. The morphine was repeated twice during the night. Transfusion was considered, but the patient seemed to be reacting so well that it was decided to postpone this procedure in case it should be more desirable later.

There was no vomiting and the patient took a large quantity of water by mouth during the night. Her pulse, which could not be counted when she left the operating table, came down to 156, and by morning it was 142. She voided satisfactorily. The next day there was some vomiting and distension, but she was relieved by gastric lavage and an enema of milk and molasses. The pulse ranged between 120 and 140, but was of good volume.

On the second day, September 10, 1920, the patient showed more improvement and it was thought that she would recover. Several times she asked to be allowed to

get out of bed, but her nurses saw no other sign of mental disturbance. At about 6:00 P. M. on that day the nurse left the room to bring some nourishment. When she returned she found the patient seated in a chair by an open window across the room from her bed. She was carried back to bed pulseless, soon became comatose, her temperature went up to 106° F., and in about six hours respiration ceased.

As an autopsy was not allowed, the actual cause of death is not known. Embolism seems probable.

Pathologic examination of the specimen showed the posterior wall of the uterus to be very soft and friable. The microscope showed extensive hyaline degeneration and round-cell infiltration throughout the entire thickness of the muscle.

In this case it would seem that the probable explanation of the rupture is that a mild infection following the curettage had resulted in chronic metritis. That infection had been present seems certain from the history, the pathologic findings, and from the presence of adhesions to the appendages. The tubes did not have the appearance of gonorrheal pus tubes, and the fact that pregnancy had taken place shows that the infection was not of the type that occludes the tubes.

How much the adherent appendages had to do with causing the rupture is hard to say. They may have been a predisposing factor in that they hindered the upward growth of the uterus and caused the posterior wall to tear before the organ was subjected to the strain of labor.

In treating this particular case, the uterus was removed because the entire posterior wall was too friable to hold a suture. Otherwise, in view of the desperate condition of the patient the rent would have been closed and the removal of the diseased organs postponed until a more favorable time.

CONCLUSIONS

1. Spontaneous rupture of the body of the pregnant uterus before the onset of labor is the result of changes in the myometrium due to (a) multiparity, (b) intrauterine manipulation with consequent infection, (c) infantilism.

2. Multiparity and infantilism are unpreventable, but in these cases the danger should be borne in mind.

3. In addition to the immediate dangers attendant on postpartum curettage, manual extraction of the placenta, and other uterine invasions, the late effects may be fully as serious and death of mother and child from rupture of the uterus in a subsequent pregnancy may be the result.

LITERATURE

Anderson, J. F.: Proc. Royal. Soc. Med. (London), 1919, xiii, (Sect. O. and G.), 188. Armytage, V. B. G.: Jour. Obst. and Gynec., Brit. Emp., 1918, xxiv, 174. Baisch: Beitr. Geburtsh. u. Gynäk., 1903, vii, 248. Campbell, J.: Jour. Obst. and Gynec., Brit. Emp., 1908, xiv, 403. DeLee, J. B.: Prin. and Pract. of Obst., ed. 1, 1913, p. 758. Devèze, M.: Montpelier Med., 1905, xxi, 611. Fleurent, H.: Gynec. et Obst. (Paris), 1921, iv, 554. Gibbon, H. B.: Tr. Ohio Med. Soc., 1892, xlvii, 218.

Ley, G.: Proc. Royal Med. (London), 1919, xiii (Sect. O. and G.), 1. *Macirone, E.:* Lancet, London, 1915, ii, 1246. *Markoe, J. W.:* Bull. Lying-In Hosp. (N. Y.), 1915, x, 166. *McPherson, R.:* Bull. Lying-In Hosp. (N. Y.), 1915, x, 168. *Mercier, R.:* Paris Thesis, 1899. *Meyer, L.:* Arch. Obst. et Gynec. (Paris), 1915, ii, 291. *Mooney, J. J.:* Jour. Med. Soc. N. J., 1909, '10, vi, 396. *Read, H. L.:* Ky. Med. Jour., Nov., 1918. *Richardson, R.:* Proc. Path. Soc. Phila., 1919, xxii, 53. *Thorne, R. T.:* Brit. Med. Jour., 1921, i, 459. *Trillat and Emery:* Bull. Soc. d'Obs. et de Gyn. (Paris), 1920, ix, 509. *Vairakiam, S. A.:* Jour. Ceylon Br., Brit. Med. Assn., 1917, xiv, 13.

STONELEIGH COURT.

THE CAUSE OF TUBAL PREGNANCY AND TUBAL TWINNING*

By LESLIE B. AREY, CHICAGO, ILL.

From the Anatomical Laboratory, Northwestern University Medical School.

INTRODUCTION

IN the course of an examination of all recorded cases of unilateral tubal twins ('22^c, 22^d, 22^e) it became apparent that the frequency of monochorial to dichorial specimens was about fifteen times greater than might have been expected from the uterine ratio. Stages were found which show how some double ovum specimens fuse and thereafter simulate true single ovum monochorial twins ('22^e). There is little doubt that this process is responsible for part of the disproportionate ratio just mentioned, yet it seems probable that some other factor operates as well, and this appears to be an excessive twinning tendency among such tubal specimens. This conclusion turns upon certain recent conceptions of the causes responsible for tubal pregnancy and the twinning impulse. Since these authoritative monographs are doubtless familiar only to those who follow the technical anatomical publications, a summarization of their contents may prove instructive beyond their direct application to the question at hand.

THE CAUSE OF TUBAL PREGNANCY

Mall ('15) has studied the material in the extensive Carnegie collection, where both specimens and clinical histories are available in many instances; his exceptional qualifications and the unique material at his disposal entitle Mall's conclusions to great consideration. Excerpts from this monograph will be quoted and paraphrased.

Tubal pregnancy is associated with "inflammatory changes which must have preceded the lodgment of the ovum in the uterine tube. . . . Any change which delays the ovum in its progress will favor tubal pregnancy." Abnormal blind tubes and diverticula are proved causative factors, but they are rare. Much more common are chronic inflammations followed by adhesions and kinking of the tube, although

*Contribution No. 93.

"it is difficult to associate adhesions on the outside of tube with the arrest of an ovum within its lumen. . . . ."

"It is also noticed that tubal pregnancy usually takes place in women who have given birth to a child and then been sterile for a considerable period.* This fact is well known to gynecologists, and they are inclined to believe that the occurrence of tubal pregnancy indicates that the inflammatory condition in the tube, which prevents pregnancy for a number of years, is gradually disappearing, so that if tubal pregnancy had not taken place, the chances are that the tube would have become healed in a few years, thus permitting the fertilized ovum to reach the uterus. This theory receives strong support from the study of numerous cases of tubal pregnancy. If the ovum within the tube contains a normal embryo, there is but little adjacent inflammation. If it contains a pathological embryo, the changes in the tube wall are usually marked, and when the ovum is well disintegrated the changes are still more pronounced. Read in the other way this would mean that if the inflammatory condition is nearly healed, the ovum implants itself in the tube and grows normally, but if the results of infection are still pronounced, the ovum rapidly disintegrates. Such an inflammatory process is signalized not only by an inflammatory reaction in the tube wall, but also by very pronounced changes within the tube lumen, the most common being a condition known as follicular salpingitis (Opitz). The tubal folds hypertrophy, their tips becoming adherent. . . . . While this process is at its height, it is clear that an ovum cannot pass through the tube and much less can the spermatozoa pass outward to reach the ovum. It is only after this process has abated somewhat that it is possible to have conditions suitable for the production of a tubal pregnancy.

"Another type of change [is] . . . . an outpocketing of the epithelial lining. Here the muscular wall is thick and fibrous and numerous small diverticula reach out into the muscular coat. Sometimes these are markedly distended at their blind ends. . . . .

"When the ovum lodges at the outer end of the tube, we should expect the outer end of the tube to be lined with fairly normal mucous membrane, but if the ovum is delayed in its progress and becomes too large to pass later through the uterine end of the tube, we should expect to find the tube lumen reduced in size in this situation. A third type of implantation usually takes place in the middle of the tube, and is the most common variety. In this type we most frequently encounter tubal inflammation and follicular salpingitis. It seems that the ciliated cells can carry the ovum to the middle of the tube, but no further.

"The nature of the inflammation which appears about a tubal pregnancy" seems in certain instances to be "due to the tightening up of an old infection that had occurred at the time of a previous labor, although the evidence points more toward venereal disease as a more usual etiological factor."

AN EXPLANATION OF TWINNING

The cause of twinning is a topic of unusual interest. The common "fraternal twins" which result from double ovulation may be dismissed from consideration. Properly speaking they are not twins at all. But what is the explanation of true twins—homologous or identical, so-called? That they come from a single ovum is certain ('22a; '22b).

---

*In another place ('22d) the writer has shown the length of this period to be about six years.

The question is how. A predisposing hereditary factor, or twinning tendency, is responsible at best only for certain double ovum specimens. Single ovum twinning, on the contrary, is not directly inheritable; it results simply from factors outside the egg which influence the course or rate of development.

In a remarkable monograph Stockard ('21) has presented the results of ten years' experimentation on the controlled production of monsters and twins. He is able convincingly to reduce the primary cause of all abnormal developments, including twins, to a single factor —developmental inhibition or arrest; the exact type of deformity that results depends solely on the precise moment when the interruption occurs.

The direct application to twinning is as follows: The periphery of the blastoderm possesses many potential points where an embryonic axis might arise. In ordinary single development one such growing point, apparently by virtue of its favorable positional advantage, gains the supremacy and suppresses all other potential points, just as the terminal bud does the lateral ones in some plants. If, however, the developmental rate is slowed at the critical moment when this axis is about to assert its dominance, its advantage is then lost and one (or more) neighboring points can now compete on more equal terms and may assert themselves as additional embryonic axes. If these growing points are far apart, separate individuals result; if nearer together, various degrees of conjoining. The critical moment for twinning is at the onset of gastrulation, which in mammals corresponds to the formation of a primitive streak. Direct experiments on fishes refer the cause of arrest to retarded oxidations. Occasional twinning in the chick and the quadruplet formation in the Texas armadillo corroborate this view. Both are subject to arrest and reduced oxygen supply—the chick's egg by a lowering of temperature when laid, the armadillo blastocyst by a quiescent period of several weeks in the uterus before it becomes implanted.

The various organs likewise have definite critical moments of origin. A particular type of anomaly, then, will depend on the precise moment when the developmental arrest became effective. Thus Stockard has been able to differentiate the following successive groups and their time relations by experimentation on fishes: (1) Twins and double embryos (pregastrulation stages); (2) suppression and malformations of the eyes (before embryonic shield); (3) suppression of primary brain ventricles (at earliest appearance of embryonic shield); (4) mouth and branchial systems (embryonic shield stage); (5) otic vesicle (later embryonic shield stage); (6) liver and pancreas (embryonic line stage).

Thus the production of twins (separate or conjoined) and all nonhereditary malformations of organs and parts are reducible to a single

causative factor, namely, a properly timed developmental arrest. This
generalization constitutes one of the most notable contributions to
modern embryology.

AN EXPLANATION OF HUMAN TWINNING, ESPECIALLY TUBAL

These fundamental concepts should apply equally well to human ab-
normalities and twinning, provided the ovum is subject to delay before
implantation and to arrest afterward. There is ample evidence of both
conditions in the tube. The fertilized ovum ordinarily occupies a week
or more in its passage to the uterus. During this period it does not
normally attempt to attach to the uterine tube. But, as Mall ('15)
has concluded, "Any change which delays the ovum in its progress will
favor tubal pregnancy." Such impediments are abnormal diverticula;
double tubes; kinking of the tube through adhesions; adherence of the
mucosal folds (follicular salpingitis); epithelial diverticula; impair-
ment of the ciliated cells. Delays due to migration from the opposite
ovary are known also. Since tubal implantation is definitely associated
with preceding inflammatory changes (p. 163), it follows that the
mucosa has thereby been injured, but at the time implantation is pos-
sible the inflammation must be largely healed (p. 164). The ovum
is taken up by the mucous membrane at the outer end of the tube,
whereupon its fate varies. Due to impairment of the ciliated cells it
may be delayed in its progress until it gets too large to pass through the
narrower portion of the tube into the uterus; or in other cases it wan-
ders into blind pockets or epithelial diverticula: more commonly still the
ovum is transported to the middle of the tube, where inflammation and
follicular salpingitis are most common, and there becomes stranded be-
cause the ciliated cells can carry it no farther.

When the progress of an ovum is blocked in one of the ways desig-
nated, it may then attack the tubal wall; in the meantime, however, it
has attained a later stage of development than is customary at implanta-
tion. If, therefore, such delayed implantation and the establishment of
tardy or inadequate oxygen relations should cause a developmental slow-
ing at the critical moment for twinning, two embryonic axes would
assert themselves, as in the fish, chick, and armadillo, and monochorial
twins result. This outline of events becomes a natural inference when
Stockard's discovery is applied to the known condition of the tube and
ovum in tubal pregnancy. It helps account rationally for the prepon-
derance of single ovum twin pregnancies in the tube, which by its
greater susceptibility to prolonged and slowly clearing chronic inflam-
mation further explains why the uterus bears relatively fewer single
ovum twins.

The production of uterine monozygotic twins and monsters is doubt-
less closely allied with, or even indirectly dependent on those condi-

tions in the tube just discussed. A nearly healed or structurally modified tube might deliver the ovum to the uterus, although tardily; simultaneous inflammation of the uterine mucosa would appear to be independently adequate. To what extent these factors operate separately and in combination must remain unsettled.

There is a demonstrable frequency of faulty implantation in tubal pregnancies. Mall failed to find a typical decidua here and hence its function in checking hemorrhage by forming a dam between the tips of the villi and the eroded mucosa is foregone. There result numerous hemorrhages, which form old clots between the villi. "Even the best of specimens frequently show such extensive hemorrhage around the chorion and such marked degeneration of the villi that it is a wonder that the ovum continues to grow normally." Checks, permanent or temporary, while the chorion is struggling to overcome natural deficiencies in its nidus are sufficient to account both for excessive twinning, if the delay prior to implantation be not sufficient, and for the observed double frequency of malformations in these specimens (Mall '17) over the uterine group.

Intensive studies on normal and pathological tubal implantation convinced Mall that the primary causative factor of such monsters is faulty implantation which prevents an adequate transfer of nutriment. Stockard agrees with the primary element but from his experimentation is forced to attribute the proximal cause to inadequate oxygen.

REFERENCES

Arey, L. B.: (a) Direct Proof of the Monozygotic Origin of Human Identical Twins, Anat. Rec., xxiii, 245-252.

(b) The Human Yolk Sac, Science, xlvi, 77-79.

(c) Two Embryologically Important Specimens of Tubal Twins (Including Critical Summaries of All Known Cases), Surg., Gynec. and Obst., in press.

(d) Tubal Twins and Tubal Pregnancy, Surg., Gynec. and Obst., in press.

(e) Chorionic Fusion and Augmented Twinning in the Human Tube, Anat. Rec., xxiii, 253-262.

Mall, F. P.: On the Fate of the Human Embryo in Tubal Pregnancy, Carnegie Inst. of Wash., Contr. to Embryology, i, No. 1, 1-104.

On the Frequency of Localized Anomalies in Human Embryos and Infants at Birth, Am. Jour. Anat., xxii, 49-72.

Stockard, C. R.: Developmental Rate and Structural Expression, etc., Amer. Jour. Anat., xxviii, 118-278.

2421 South Dearborn Street.

REPORT OF A CASE OF LABOR COMPLICATED BY OVARIAN CYST AND SMALL POX: OPERATION: SPONTANEOUS DELIVERY: RECOVERY

By R. A. Bartholomew, M.D., F.A.C.S., Atlanta, Ga.

Mrs. S. W., colored, age thirty, Grady Hospital No. 6722, was admitted Jan. 13, 1921, in labor. She had always been in good health, had had no operations, and no serious illnesses except pneumonia and malaria in childhood. She had no symptoms of venereal disease. The menses had begun at 13, and had always been regular and normal in duration and amount. She had been married six years, and had had nine pregnancies, three of which resulted in miscarriages. Four children are living, the oldest six years, the youngest 14 months. These pregnancies and labors were full term and normal, the first lasting ''several days,'' the last, four hours. The puerperia were normal.

The last period occurred April 26, 1920. There had been no abnormal symptoms and no complications throughout the pregnancy, except that for several days preceding admission, she had had severe backache, chills and fever. (There was a mild epidemic of small pox in the city at this time and, as was afterward ascertained, the patient had never been vaccinated.)

Labor pains began Jan. 13, 3 A. M., and she was admitted to the hospital 11 A. M. at which time the temperature was found to be 100, pulse 128, and respirations 20. Examination showed heart and lungs normal; blood pressure 135-75; measurements, interspinous 24 cm.; intercristal 27 cm.; external conjugate 20 cm.; the fundus extended to the ensiform; the fetus was in the R. O. A. position and the head movable over the inlet. The fetal heart sounds were normal. The membranes ruptured spontaneously at noon, following which a rectal examination showed the head movable at the inlet and the cervix dilated about 6 cm. There was an ill-defined, semicystic mass palpable high up, posterior to and just above the level of the cervix, and which could not be easily displaced. As the patient was a multipara and the pains rather irregular and of short duration, it was thought that a natural delivery might take place if the patient was given more time to overcome the obstruction high up in the pelvis. There seemed to be no plausible explanation in the history or physical findings for the elevation of the temperature and pulse, and the patient seemed to be in good condition and showed very little evidence of discomfort.

At 7 P. M. the temperature was 100, pulse 118, and respirations 28; the pains occurred every 5 to 6 minutes but were of short duration; the breech was in the fundus, the back in the midline, the head over the inlet and still movable, and showed no definite cephalic prominence. The fetal heart sounds were normal. There was marked tenderness to palpation over the pelvis. Vaginal examination showed the cervix almost completely dilated, the head presenting, somewhat deflexed and in posterior asynclitism, the large fontanelle being easily reached just to the right of the midline and the sagittal suture transverse and just behind the pubes. The posterior parietal bone was markedly overriding the anterior. The tumor mass was now distinctly palpable, having been forced down deep in the culdesac. It was fixed, smooth, very tensely cystic, and tender, and had the size and shape of an adult's kidney, lying transversely, convex surface down. The mass was even more distinctly palpable by rectal examination.

Delivery was evidently completely obstructed by an ovarian cyst and laparotomy urgently indicated. The abdomen was opened under light ether anesthesia, by an incision extending from the pubes to about 5 cm. above the umbilicus. The tumor was found to be a large cyst of the left ovary, wedged deep into the culdesac, and adherent by moderately firm adhesions to the posterior vaginal wall, lower uterine segment, and lateral and posterior pelvic walls. Very little could be accomplished until the pregnant uterus, covered with warm, moist sterile towels, was lifted out of the abdomen and held anteriorly to the right. The adhesions were then gradually separated and the tumor freed and removed at the pedicle with the fimbriated end of tube. The pedicle was ligated and transfixed to control all bleeding. The right tube and ovary were normal. The pregnant uterus was then replaced in the abdomen and the abdominal incision closed.

Contractions of the uterus which were very light and infrequent during the operation, recurred with greater strength and frequency after replacing the uterus and at the end of half an hour following the operation, the baby was delivered spontaneously and normally while the patient was reacting from the anesthetic. The baby was a healthy appearing, seven pound, male child, and cried vigorously within a few minutes after birth. There was no laceration, and the placenta was expressed complete after the usual interval. The pulse after delivery was 96 and there was no excess bleeding.

Examination of the cyst after operation showed it to be a dermoid cyst of the ovary, 15 x 8 cm.; irregularly oval in shape. On section of the cyst, it was found to be multilocular, there being two large and one small locule filled with putty-like, yellow sebaceous material and masses of hair. A tooth was found in the locule nearest the pedicle.

The temperature and pulse were practically normal on the day following operation, and thereafter. On the second day after operation the patient developed a typical small pox eruption over the forehead, arms, hands, wrists, etc., and which passed through the various changes typical of such eruption, and disappeared by the time the patient was discharged from the hospital. The abdominal wound healed by primary union and there were no postoperative complications.

The baby was vaccinated after birth and showed no evidence of the disease at any time. It nursed and gained satisfactorily, and was discharged with the mother Feb. 3, 1921.

20 PONCE DE LEON AVENUE.

THE SERVICE OF AN OBSTETRICAL CLINIC TO THE COMMUNITY*

By Arthur H. Morse, M.D., New Haven, Conn.

*From the Department of Obstetrics and Gynecology, School of Medicine,
Yale University.*

IN CONSIDERING the service of an obstetrical clinic to the community, my viewpoint is that of a university teacher whose activities lie in both hospital and medical school, and who therefore comes in contact with dispensary, ward and private patients, and is in constant touch with junior assistants, medical students, nurses and general practitioners. Since the degree of service which the clinic can contribute depends so largely upon its physical plant and organized personnel, these will be emphasized first. The various avenues through which the service of the clinic can be directed will then be shown. Finally, as important requisites for improving conditions pertaining to the welfare of women and infants, I shall advocate extending the province of the obstetrical clinic to include the study and treatment of all diseases of the female generative organs and further educating the public regarding proper attention during pregnancy and labor.

To be most effective, the various activities of the clinic should form by themselves a departmental unit of a general hospital. This department should possess a sufficient number of beds, both free and semiprivate, delivery and operating rooms properly equipped, a prenatal clinic, an out-patient service for the care of women who are to be delivered at their homes, and a postpartum clinic for the supervision of women following delivery. Moreover, there should be laboratories equipped for the conduct of investigative work. Finally, there must be an adequate staff of trained assistants and nurses.

The senior staff should consist of a chief of service and his associates, whose principal duties are the care of patients, the teaching of students and the direction of investigative work. The house staff should be composed of a resident, assistant residents, and internes. Personal experience has taught me that the pursuit of an active practice precludes the proper conduct of a modern clinic. Therefore, while the strict academic plan may not prove to be ideal, I am convinced that a clinic exerts its widest influence if the director and his associates confine their work to one hospital. A graded house staff consisting of residents and internes is of notable advantage to surgeons and to patients. Men who have advanced through preliminary

---

*Read at the Annual Meeting of the American Child Hygiene Association, October 14, 1922.

training to the residency are in a position to share the responsibilities and strains of clinical work and are qualified to care for sudden obstetrical emergencies. In addition, the resident staff is a valuable adjunct to the teaching force of the clinic.

The first duty of the clinic is the care of patients. The number of hospital beds assigned for this purpose varies according to the community, but for the type of staff which I have in mind this should not exceed one hundred. Of this number a certain proportion should be reserved as a prenatal ward for the observation and treatment of abnormal cases of pregnancy. Furthermore, it should be emphasized that the possession of prenatal beds makes available facilities which are indispensable for the proper instruction of students and nurses.

From this brief outline of the organization and administration of a clinic, I turn to a consideration of the avenues through which it can contribute to the welfare of the community. Patients should be encouraged to register in the prenatal clinic in the early months of pregnancy. At the first visit, a thorough general physical examination should be made during which particular attention should be directed toward the discovery of pulmonary or cardiac lesions. Blood should be taken for a Wassermann reaction, the urine should be studied, and the blood pressure should be determined. Finally, the pelvis should be accurately measured.

In encouraging attendance on the out-patient clinic, no factor is of greater advantage than consultations by appointment. We have recently adopted this system and it has proved so satisfactory that I shall speak of it in detail. The dispensary clientele is no longer requested to be present at the opening hour of the clinic, but each woman is assigned a definite appointment for each consultation. In this way, the irregularity of attendance so familiar to all of us is avoided and an even distribution of patients is obtained. As a result, no time is wasted as under the old system. This is an important item to women who are employed and to mothers who are burdened with household duties and the care of large families. Under this system, the energy of the clinician is better utilized and he is enabled to give more concentrated study to the individual patient. Interesting cases are more carefully followed and if desirable grouped for instruction. Moreover, the student's interest is aroused and the quality of his work is improved. We are gratified also to find that the appointment system conserves the time of social workers and nurses connected with welfare organizations, for formerly they were obliged to wait when they accompanied patients to the dispensary for consultation. Under the new system, these workers can arrange for appointments and their patients will be seen at the periods allotted to them. Those who are associated in the conduct of a woman's clinic should know

that even a dispensary patient possesses a certain delicacy of feeling and they should realize that privacy influences a woman's psychological reaction. The least offence is given and the best results are obtained when the woman visiting the dispensary is afforded that consideration which would be given her by a private physician. The adoption of the appointment system is a step toward this ideal. In order to give equal opportunities to middle class patients, who cannot afford the expense of numerous consultations but do not wish to be objects of charity, it appears that similar pay clinics would offer a much needed service to the community.

The outside service is concerned principally with the delivery at home of multiparous women who present no abnormalities. Primiparous women should not be attended by this service for the obvious reason that the character of labor in these patients is uncertain. Neither should the entire responsibility for out-patient deliveries be entrusted to undergraduates alone, but a student should be accompanied by a member of the staff and a nurse. As a means of instruction the value of an out-patient service is debatable, for it appears quite as little justifiable to teach abdominal surgery in a poorly equipped home as to teach obstetrical technic and operative procedures under similar circumstances. Therefore, I am in accord with those who favor the abolition of out-patient services and the restriction of the teaching and practice of the obstetrical clinic to the hospital.

If the service of the clinic is constantly to improve, the staff must review all details in each case on discharge. Nor does the duty of the clinic end here. Upon leaving the wards, the patient should be directed to return upon a stated date to the postpartum clinic. Such a routine study of patients following delivery frequently reveals injuries to the pelvic floor or pelvic abnormalities which demand operative treatment if the woman is to be returned to sound health. On the other hand, future surgical interference may be obviated as when, for example, a puerperal retroflexion of the uterus is permanently corrected by the insertion of a pessary. Moreover, prolonged observation is particularly indicated in those patients whose pregnancies have been complicated by a toxemia or by a cardiac lesion, for the information derived in this way is invaluable in the event of a subsequent pregnancy.

Now the efficiency of the ante- and postpartum clinics and of the outside obstetrical service, if that be still maintained, depends largely upon the possession of an adequate personnel of well-trained obstetrical nurses and social workers. It is their duty to see that patients are given their appointments and that they return at proper intervals for subsequent examinations. They instruct prospective mothers regarding such matters as a proper diet, the advisability of

refraining from excessive work during the latter part of pregnancy and the significance of antepartum hemorrhage. If there are evidences of a toxemia, they direct the patient to the dispensary or hospital for examination or treatment. Then, too, the decision to deliver a patient outside the hospital frequently depends upon the results of their investigation of the home surroundings. No one familiar with the work of a modern clinic will undervalue the services which this division of its personnel contributes to the community.

Another type of service depends upon the fulfillment of responsibility of the clinic as a teaching center. Its resident staff is composed of young men who will later become practicing specialists or perhaps teachers and directors of similar departments in medical schools or hospitals. These men should be allowed every opportunity for familiarizing themselves with the methods of prenatal care, the conduct of labor and the puerperium, the pre- and postoperative care of patients and ward administration. Moreover, they should be taught the various surgical procedures employed in the treatment of obstetrical and gynecological patients and should be given experience in the instruction of students.

No one familiar with the general low standard of obstetric practice will underestimate the importance of student instruction. Students of today become the practitioners of the future and through them the ideals of the clinic are carried directly to the community. Therefore, adequate undergraduate training is essential if the standard is to be raised. All students should be taught the fundamentals of obstetrics; in addition, elective courses should be offered to those who wish to do more advanced work. Such an elective plan makes possible intensive teaching to smaller groups of selected fourth-year men. Moreover, men so trained will be of greater value to the community as general practitioners, while they will possess a foundation upon which to build if they choose to engage in postgraduate studies.

One of the greatest obstacles to the successful conduct of an obstetrical clinic is the difficulty encountered in obtaining well-trained obstetrical nurses. Few women choose this branch of the profession as their life work and many state frankly that they dislike obstetrics. However, in many instances the aversion which is felt toward this field of medicine depends upon inadequate knowledge concerning it. Pupil nurses are impressed with the drudgery of obstetrics; their deep interest in the subject as one of the most important divisions of surgery is seldom aroused. Furthermore, the usual undergraduate training is insufficient to impart that degree of information which conduces to equanimity during the progress of a difficult labor.

Now the nurse bears a heavy burden of responsibility and in order to have peace of mind while caring for an obstetrical case, she must

possess an adequate amount of scientific knowledge. In addition to her experience of general surgical nursing, she should know the anatomy and physiology of the female generative organs and should be informed concerning the physiological changes which occur during pregnancy. She should be familiar with the symptoms and signs which indicate the presence of abnormalities in the prenatal period. She should understand the mechanism of labor and should be acquainted with the physiological and pathological changes of the puerperium. Well-trained obstetrical nurses not only are essential for the proper conduct of a modern clinic, but they compose an important division of the personnel of social and welfare organizations. In this connection state health departments find it difficult to secure nurses adequately trained in this branch of the profession to act as supervisors in the field. Consequently, the clinic should be glad to cooperate in the education of the nurse and should offer her opportunities for advanced postgraduate instruction.

Since the majority of obstetrical patients first consult the general practitioner, he frequently encounters major obstetrical complications which need the resources of the clinic for their proper solution. In these matters, the attitude of the staff should be sympathetic and friendly. The local physician should be encouraged to confer with them concerning difficult questions of diagnosis and to send to the hospital complicated cases of pregnancy and labor which require the facilities of a well-equipped clinic for their successful treatment. In brief, the too frequently prevalent spirit of antagonism should be obliterated and hospital and local physician should cooperate for the welfare of the community.

Cooperation between the clinic and welfare associations offers another means by which valuable service may be rendered. These organizations come in close contact with women of limited education and means, and they possess conspicuous opportunities for raising the standard of obstetric practice by emphasizing the importance of adequate prenatal care and of skilled attention during delivery. Moreover, their visiting nurses can influence many women to visit the dispensary for examination or treatment. Finally, duplication of work and equipment would be avoided and a notable step in advance would be made if established clinics were to act in the rôle of consultant for the prenatal centers which are being developed throughout the country.

The staff of a modern hospital should further contribute to the welfare of the community through investigative work in obstetrics and gynecology. In addition, therefore, to the facilities which I have mentioned, the obstetrical clinic should possess laboratories equipped

for the study of anatomical, physiological, pathological and chemical problems.

Having indicated the type of service which an obstetrical clinic can render, I wish to point out the greater value to the community of a departmental unit which deals not only with obstetrics but which includes within its province the study and treatment of the pathology of the entire female reproductive tract. From experience in general surgery and obstetrics, I believe that no complications occur which demand greater judgment and skill than do those which are met by the obstetrical surgeon. For example, he must treat such conditions as a ruptured uterus, or a perforation of the uterus associated with laceration of the intestine; he must be capable of delivering successfully a patient who presents an adherent incarcerated uterus at term. In any one of these circumstances the life of the patient is further jeopardized unless the operator is proficient in the technical procedures employed in pelvic and abdominal surgery. But since the percentage of abdominal operations in a clinic limited to the care of obstetrical cases is relatively small, this necessary technical skill can be gained only in a department which combines the study and treatment of obstetrical and gynecological cases. Moreover, such an organization provides distinct advantages for investigative work, teaching and clinical instruction. It attracts to its personnel assistants of a higher grade than if its work were restricted merely to the care of women in labor. It benefits the community by developing men of broad knowledge and experience who are qualified to deal not only with the less intricate problems of pregnancy and labor, but also with the major obstetrical and gynecological complications.

Greater efforts must be made toward the education of the laity regarding the necessity of adequate supervision throughout pregnancy and of skilled attention at the time of delivery. They must be brought to realize that, excepting gonorrheal infection and tumors, practically all diseases of the female reproductive tract are intimately related to childbirth and are largely preventable. They must be taught that for primiparous women and for all those presenting abnormalities, a well-equipped hospital is the safest place for delivery. Finally, they must learn that the successful management of the major obstetrical complications depends upon the surgeon's possession of the highest type of judgment and skill.

To recapitulate: Such a clinic should be a divisional unit of a general hospital and should be conducted by a senior staff whose time and energies are wholly devoted to the activities of the department and by a junior house staff composed of a resident, assistant residents and internes.

Contributions should be made to the community by cooperating with

general practitioners and welfare organizations in the care of patients, by training future teachers and specialists, by teaching students and nurses and by investigating problems relating to pregnancy and the diseases of women. In order that poor women and those of the middle class may avail themselves of the facilities of the clinic, it must possess free and semiprivate beds.

The greatest service will be rendered to the community by a clinic which cares not only for normal and complicated obstetrical cases, but which includes within its province the study and treatment of all pathological conditions of the female generative system.

Finally, that the service of the clinic may be extended to the greatest number of women of the community, the laity must be so educated along the lines I have indicated that they will be eager to seek the advantages which are available to them.

MANAGEMENT OF THE PLACENTA IN ABDOMINAL PREGNANCY. WITH A CASE REPORT*

By William A. Jewett, M.D., F.A.C.S., Brooklyn, New York

THE number of cases of extrauterine pregnancy that progress to term or near term is comparatively small. They do occur with sufficient frequency, however, to warrant our serious consideration. The very gravity of the condition demands the reporting of every case, and these reports should contain complete data in reference to the attachment of the placenta, its treatment and the end result. It is only in this way that an adequate amount of material can be obtained for a proper study of the best method of handling the situation.

The diagnosis of abdominal pregnancy having been made, the child must be removed by abdominal section. There can be no difference of opinion on this point. The serious question that then must be decided is: What procedure will best safeguard the interests of the mother? To answer this question we must first determine whether or not the placenta can be removed without danger of serious blood loss to the patient. If the blood supply can be controlled, the placenta should be removed. Fortunately in many instances its attachment is more or less pedunculated. Under such conditions the base may be ligated and its removal accomplished without danger. At other times, though it be attached by a broad base, the site is such that the blood supply can readily be controlled by clamp or ligature prior to its separation. Such locations may be on the body

of the uterus, the broad ligaments or the adnexa. The ovarian and uterine vessels can be ligated as the first step in the operation or if necessary a hysterectomy can be performed. After the removal of the placenta, peritonealization may be accomplished and the abdomen closed without drainage. These I would class as favorable cases.

Fig. 1.—Dr. Jewett's case of abdominal pregnancy showing fetus and placenta *in situ.*

When, however, a less favorable condition is met, the gravity of the situation is greatly increased and much depends on the course that is followed. A placenta attached to the posterior pelvic wall, the anterior parietal wall or to the abdominal viscera is fraught with great danger; primarily the danger of immediate hemorrhage and

later the danger of secondary hemorrhage or of sepsis. Careful consideration must also be given to the general condition of the patient. In reviewing the reported cases many were found to have been poor operative risks. How then shall we proceed under such conditions? There are but three courses to pursue: 1. Separation and removal; 2. marsupialization; 3. leave *in situ*, with or without drainage.

1. Separation and removal of the placenta with firm tamponade of the site to control the bleeding, is a doubtful procedure as it exposes the patient to all three of the risks enumerated above, especially the danger of immediate hemorrhage. The mortality has been high in the cases so treated.

2. Marsupialization with firm tamponade of the sac offers a better prognosis. There are many reported instances where this method has been successfully followed, in which the placenta has gradually separated, been delivered through the wound with subsequent closure. Wilbur Ward reported two such cases before this Society. In the first case the patient delivered the placenta on the seventeenth day, the wound closed and the patient recovered. In the second, the wound closed without delivery of the placenta; the patient recovered from the operation but died of uterine hemorrhage 50 days later. By this method the immediate danger of hemorrhage is practically eliminated, as there is no contraction of the placental site. There is, however, the element of doubt as to whether the placenta will separate and be delivered or not. Condit's case is interesting in this connection. He operated upon a patient five weeks after the death of the fetus in the abdomen and found that in that time no placental separation had taken place. Its removal was attended by severe bleeding. There is always present the danger of sepsis which is somewhat favored by the open wound.

3. To leave the placenta *in situ* and drain the abdominal cavity would seem to be open to all the objections of the last method with a greatly increased danger of sepsis as there is no walling off of the general peritoneal cavity from the local area involved. In the presence of sepsis at the time of operation drainage would be necessary, but one would hesitate to elect this method in a clean case. Leaving the placenta undisturbed and closing the abdomen without drainage has certain advantages in these unfavorable cases. The danger of immediate hemorrhage is removed; the danger of introducing infection at the time of operation is minimized and there is very much less shock to the patient. The danger of secondary hemorrhage within the abdominal cavity would seem to be slight, as I found no instance of its occurrence in the literature. Late sepsis is always possible though rare, and if it does occur can be controlled by drainage through a posterior section.

Beck, after a review of the literature up to 1919, showed that the mortality in patients treated by this last method was lower than those treated with drainage. In spite of the fact that the mortality was shown to be lower, I find no recorded instances of this method having been deliberately followed since that time. The tendency has been for the operator to remove the placenta at once, or at least to attempt to remove it, irrespective of the condition that is present, and too often has this attempt been unsuccessful, because of the bleeding, and the use of the pack resorted to. By this unwarranted manipulation the patient has been denied the full protection to which she

Fig. 2.—Same case, showing placenta posterior to uterus in culdesac.

is entitled. Time should be taken to study the situation, the course of action determined upon and then only should the operation proceed.

Sufficient evidence is not at hand to determine definitely what becomes of the retained placenta. It may be completely absorbed, it may be partially absorbed with a certain amount of calcification or it may become organized or encapsulated.

I desire to report a case operated upon by me one year ago, in which the placenta was not disturbed and the abdomen closed without drainage, and give the present condition of the patient. If any further procedure is undertaken in this case, I will report on the findings later.

Mrs. W. H., thirty-four years of age, had spontaneous labor in March, 1914. I first saw her again on Sept. 11, 1921. She then gave me the following history.

There had been no pregnancy since the one cited above until the present one. There had been no illness during this interval; her menstruation had been regular, of the usual duration, with no pain. Her last regular period began on Feb. 12, 1921, was normal in every respect. She skipped the March period. About the first of April she began to have a rather excessive nausea and vomiting with considerable pelvic pain. This was followed by a moderate vaginal bleeding and a diagnosis of inevitable abortion was made. She was then living out on Long Island and consulted a local physician who dilated the cervix and packed it and the vagina with gauze on April 15th. She continued to bleed slightly for over a month and on May 20th the hemorrhage was so profuse that the vagina was again packed. This last packing controlled the bleeding. She was fairly comfortable from this time on until the last of July when she began to have attacks of abdominal pain, slight at first but increasing in severity. My associate saw her at this time, gave her morphine, with rest in bed, believing she was threatening to miscarry. He attended her through several of these attacks in the six weeks following, and when I first saw her on Sept. 11 the pain was almost continuous. At no time was there any sudden, severe attack of pain. Her pain was located chiefly in the upper part of the abdomen and was associated with attacks of nausea and vomiting. She became very weak and though the abdomen increased in size, the patient lost weight and flesh rapidly as was shown in her face, arms and legs.

Physical examination at this time showed the abdomen distended to the size of a pregnancy at term; the fetus was lying obliquely with the head in the upper left quadrant, the body extending downward to the right. There was a firm mass in the mid-line extending from the symphysis half way to the umbilicus. The fetal heart could be heard above the umbilicus on the left side. The cervix was found crowded forward behind the os pubis by a boggy mass that filled the culdesac of Douglas. A tentative diagnosis of extrauterine pregnancy was made and the patient was kept under close observation. The findings at subsequent examinations were unchanged except for a slight increase in size. Her heart, blood pressure and urine were normal. Two weeks prior to the expected date of labor she was prepared for operation, which was performed at the Long Island College Hospital. The laboratory findings at this time were as follows:

Blood count: Red cells, 3,940,000; leucocytes, 11,200; polymorphs, 69 per cent; hemoglobin, 55 per cent. Blood pressure: Systolic, 122; diastolic, 85. Urine, negative. Phenolphthalein: 1st hour 15 per cent; 2nd hour 25 per cent. Blood chemistry: Urea, 39.50; uric acid, 5.00; creatinin, 1.80; sugar, 97.50.

Operation.—High left rectus incision. The omentum was attached to the parietal wall and to the fundus uteri by adhesions that were easily separated. There was a small amount of clear fluid in the abdominal cavity. On reflecting the omentum upward the child was found free in the abdomen lying transversely among the coils of the small intestine behind the stomach and transverse colon with the head deep under the costal margin on the left, the dorsum anterior. (Fig. 1.) The fundus of the uterus was flattened from before backward occupying the lower anterior portion of the abdomen and pushed forward by the placenta. There were no adhesions to the child which was readily extracted, the cord being clamped and cut. A careful examination of the placenta was then made. There were only a few small shreds of membrane to be found. The placenta itself, very large and with a broad base, was attached to the right side of the posterior surface of the uterus, the right broad ligament extending into the culdesac and up on the posterior pelvic wall as far as the brim of the pelvis, overlying the iliac vessels of that side. (Fig. 2.) It was

evident that it could not be removed without serious hemorrhage and there was no sac of membranes to be sutured to the abdominal wall. Under these circumstances it was decided not to disturb the placenta, so the cord was tied in two places, cut short and the abdomen closed without drainage. The operation was conducted under gas-ether anesthesia and was completed in 30 minutes.

The patient was returned to bed in good condition and there was no marked postoperative reaction. The temperature rose to 101° F. on the day following operation, reached normal on the third day and continued normal from that time on. The usual postoperative treatment was given and she had an uninterrupted recovery; out of bed in two weeks and discharged from the hospital on the eighteenth day.

Pelvic examination on discharge showed the uterus somewhat firmer and smaller in size, the cervix soft, nearer normal position with the placental mass filling the Douglas from the level of the external os. There was no posterior vaginal fornix. The mass was somewhat sensitive to pressure from below. Its upper limit could not be determined at this time.

The child, a female, weighing $7\frac{3}{4}$ pounds, breathed spontaneously and cried for three or four minutes. Heart normal. While tying the cord the baby stopped breathing and the heart rate dropped to from 40 to 60; traction on the tongue, artificial respiration, hot and cold tubs were necessary for resuscitation. After about ten minutes the baby began to breathe normally but always retained a bluish color. Heat was applied externally and oxygen given continuously. Baby continued in the same condition for two and a half hours and then ceased breathing. Postmortem examination showed a pulmonary atelectasis.

Subsequent History.—The patient at the time of her discharge from the hospital weighed 100 pounds. She was very weak and emaciated but was able to retain food and her bowels were in good condition. She gained in weight rapidly and steadily, putting on 30 pounds in two months. Her first uterine bleeding, except that immediately following operation, occurred six weeks later and continued for 30 days. It was never profuse nor was it associated with any pain. One month later, on March 3, she had a normal flow. She has been regular ever since, her periods being normal as to interval, duration, character and freedom from pain. Pelvic examinations at frequent intervals showed a gradual decrease in the size of the placental mass. On April 5, for the first time, the posterior lip of the cervix could be identified separate from the mass. There has been no apparent diminution in the size of the mass for the past six months. It is, however, somewhat more movable in the pelvis and much less sensitive, the chief discomfort at present being due to a tugging on the rectum on pelvic examination. When seen last week, the patient was perfectly well; weight 160 pounds.

380 VANDERBILT AVENUE.

AN ANAL SHIELD

By J. P. Greenhill, B.S., M.D., Chicago, Ill.

(From the Chicago Lying-in Hospital and Dispensary.)

THE difficulty of avoiding contact with the anus when doing perineal and vaginal repair work is well known. Numerous devices have been used to cover the anus but none are uniformly successful. The towel, kept in place with adhesive straps, is most commonly in use; but the chief objection to the towel other than it often falls off, is that blood, liquor amnii and even fecal matter seep through not infrequently, thus defeating the purpose for which the towel is used.

At the Chicago Lying-in Hospital for the last eighteen months, a small, light metal shield has been used with great success. This shield may be made of any light metal such as aluminum, tin, soft steel or copper. If made of these metals, the weight will not exceed a few ounces. The shield may be made as large or as small as the operator desires, but a convenient instrument is one which is approximately 11 cm. long and 8 cm. wide. At each upper corner of the shield is a projection outward about 2 cm. wide and 1.5 cm. long, which contains a small opening to accommodate a skin clamp. (See illustrations.) At the upper edge are two small ledges about 1.5 cm. wide and 0.5 cm. long, at an angle of 45° with the shield. These are situated at the upper corners and are for the purpose of keeping the plate away from the anus. For the same reason the lateral edges of the shield are turned backward about 1 cm. These small ledges are sufficient to keep the plate away from the anus even if large hemorrhoids are present, because the curve of the nates projects beyond the anus sufficiently to prevent any contact between the latter and the shield. The lower portions of the ledges, for a distance of about 4.5 cm. are turned forward, the purpose being to prevent any clamps which may be placed on the anterior surface of the plate from rolling off the sides.

When the operator is ready to use the shield, he cleans the perineum, places the shield horizontally against the buttocks just above the anus and with small skin clamps placed through the openings in the upper outer angles of the shield, he grasps the skin. There need be no fear that these skin holes may give rise to trouble, for the writer has not seen a single infection or other complication result from them. After the clamps are in place, the shield is dropped and it is found to cover the anus without touching it. There is a space between the fourchette and the shield so that the blood which escapes from the vagina trickles down over the perineum to the basin below. If some of the blood should perchance touch the back of the plate, none can penetrate to the anterior surface. If the shield comes very close to the anus, as may happen in a very thin individual, it is very easy to curve the shield in such a way that it will stand away from the anus. On the other hand, in very stout women where the shield might be too far from the anus, the plate may be likewise appropriately curved to bring it nearer the anus.

The instrument has the following advantages: It can easily be made out of a piece of aluminum, tin, soft steel or copper. It can be boiled with other instruments and used for years. The discharge from the uterus and vagina cannot contaminate the anterior surface of the shield, and instruments may be permitted to

Fig. 1.

Reverse side of anal shield
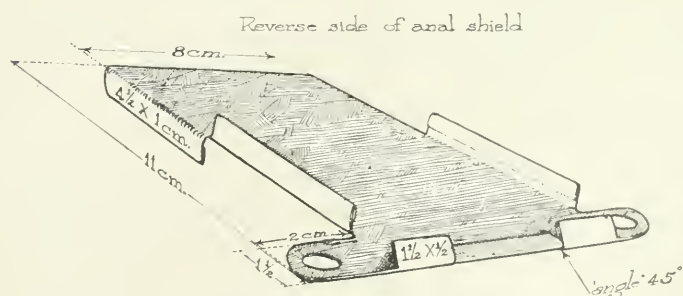
Fig. 2.

rest on the plate with impunity. There is no danger of having the shield drop as so frequently happens with towels or where pieces of rubber are used. If one should want to insert a finger into the rectum during an operation on the perineum, it is very easy to slip the finger under the shield into the rectum thereby elevating the instrument to an inclined position. When the finger is withdrawn, the shield falls back into its original position. The instrument is useful not only when one repairs perineal lacerations after childbirth, but also when any operation in the vagina, on the perineum or on the vulva is performed.

Recently an improvement was made by bending the lower 1 cm. of the plate backward. This prevents blood which may trickle down over the anus and touch the posterior surface of the shield from coming in contact, at the bottom of the plate, with any instruments resting on the anterior surface of the plate.

426 East Fifty-first Street.

BENZINE AND IODINE VS. SOAP AND WATER SCRUB IN THE PREPARATION OF PARTURIENT WOMEN FOR DELIVERY

By Frederick C. Irving, M.D., Boston, Mass.

(From the Department of Obstetrics, Harvard Medical School)

ON PAGE 177, Vol. II of The American Journal of Obstetrics and Gynecology, Lankford describes his technic for the preparation of women in labor for delivery. The patient is given an enema as soon as possible after the beginning of labor. The anal region is wiped clean and a vulvar pad is applied. When well advanced in the second stage of labor the pubes and labia are shaved, using benzine as a softening agent. When the head is distending the vaginal outlet, the vulva is painted with half strength iodine, followed by a similar application to the pubes, the lower abdomen, the inner side of the thighs, and last, the perineum, the buttocks and the anus. Cultures are then taken by rubbing swabs over both labia, across the pubes, in the crevices around the clitoris and across the perineum. Similar cultures are also taken after delivery.

In a series of 29 cases he obtained no growth on bacteriologic examination except in one case where a mould was found, probably air implanted. In view of accepted knowledge concerning the abundant flora of the vulvar and perineal regions and of the comparative failure of all methods of skin surface sterilization in other regions of the body, his results justly may be considered surprising. I therefore repeated his work on a larger series of cases at the Boston Lying-in Hospital and at the same time took an identical series of cultures from an equal number of patients prepared according to the hospital technic, which is as follows:

On admission the patient receives an enema and a bed bath. The

pubic and vulvar regions are then shaved and a sterile pad applied. When the time for delivery approaches, the nurse scrubs her hands in soap and water for five minutes, immerses them in sterilizing solution (70 per cent alcohol) for two minutes and then scrubs the patient after putting on a pair of sterile gloves. The scrub lasts five minutes and begins at the vulva, then takes in the inner surface of the thighs working toward the knees, with the buttocks and anus last. Any cotton which has passed over the anus is immediately discarded and there is no water or any other solution poured over the vulva at any stage of the preparation. After the soap and water scrub, the nurse goes over the same area in the same manner with bichloride solution

Chart I

No growth before or after delivery

50 cases   50 cases

Growth   Growth

21 cases   22 cases

No growth   No growth.

Benzine and iodine.   Soap and water, bichloride and alcohol.
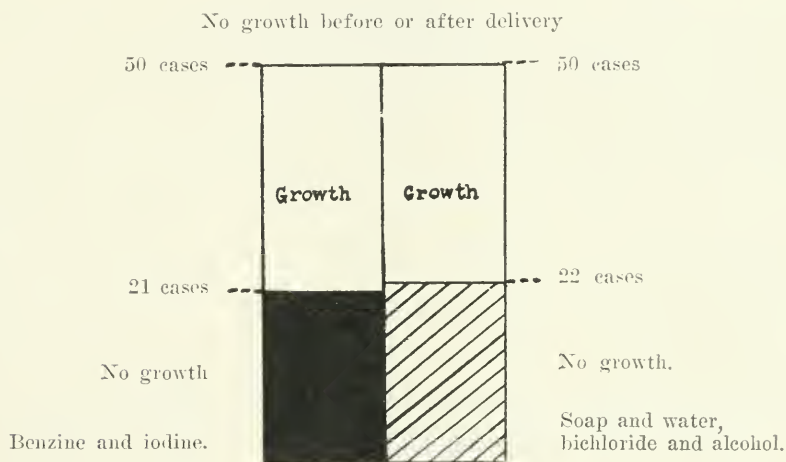
and the house officer repeats it with sterilizing solution just before delivery.

Fifty patients were prepared by the benzine and iodine method, and another series of fifty, alternating with them, were treated by the usual soap and water, bichloride and alcohol technic above described. Cultures were taken on all cases both before and after delivery and examined bacteriologically in the pathological laboratory of the Massachusetts General Hospital. The comparative results obtained are shown graphically in the accompanying charts.

Twenty-one, or 42 per cent, of the cases prepared by the benzine and iodine method showed no growth before or after delivery as compared with 22, or 44 per cent, of those treated with the soap and water, bichloride, and alcohol technic. Consequently both methods were equally ineffective in procuring an absolutely sterile field.

The puerperium was considered febrile if the temperature reached 100° F. or more on two or more successive days before discharge from

the hospital. Four out of 50 benzine and iodine cases showed such a reaction as compared with eight prepared by the usual hospital technic. Apparently, then, the simpler method was twice as effective as the soap and water scrub, provided these infections can be considered as introduced from without at the time of labor.

A further analysis of these 12 cases showed:

1. None of the temperatures could be attributed to any cause outside the generative tract. Five cases were classed as sapremia, four as mild septic uterine infections and three as salpingitis.

2. The four febrile benzine and iodine cases showed no growth either before or after delivery, nor were any of them examined by

CHART II

Comparative morbidity
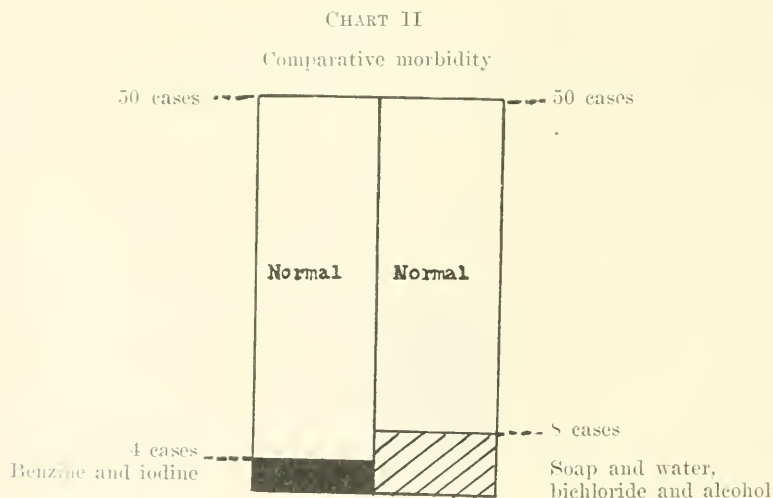
vagina at any time. It seems likely, therefore, that the temperatures in these cases were due to infection already existing in the generative tract at the time of delivery, to contamination during the puerperium, or, what is less likely, to a spread from some remote focus in the body.

3. Of the eight cases with febrile puerperia, prepared by the soap and water scrub, bichloride and alcohol method, four showed sterile cultures before and after delivery. One of these cases was examined vaginally once. Three of the remaining four cases showed a moderate growth of staphylococci before delivery but no growth afterward. One of these cases was also examined vaginally once. The remaining case showed a profuse growth of a colon-like bacillus both before and after delivery but was not examined by vagina.

Although both methods were equally unsuccessful in securing surface sterilization, the benzine and iodine technic was twice as effective as the soap and water scrub in preventing infection. I believe with Lankford that contaminating material may be washed into the

vagina by scrubbing with soap and water and that this is particularly true when water or solutions are poured over the vulva. It is quite conceivable that this factor may account for the increased morbidity in the soap and water cases.

It is futile to expect 100 per cent sterility with any method of preparation at present known. The clinical histories of large series of cases will be more valid evidence than bacteriologic examinations in determining which of various methods will prove the most effective. Such a series of observations will be started in the near future as I realize that the present number is too small to justify definite conclusions. It should be remembered that in the work outlined above, attention was directed solely to the vulva and the surrounding parts and that no attempt was made to sterilize the vagina.

The cultural reports showed little difference between the two methods in regard to the specific bacteria found. As might be expected, the staphylococcus was the most frequent organism, with mixed infections second, and a pure growth of colon-like bacillus third. The streptococcus was recovered once in each series, but on neither occasion did the patient show any elevation of temperature.

443 BEACON STREET.

Society Transactions

DR. JOHN F. ERDMANN, New York, N. Y., read a paper on **Tumors of the Breast**. (For original article see page 117.)

DISCUSSION

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—A number of years ago I heard Murphy declare that in carcinoma of the breast metastasis never takes place in the pectoral muscles. He therefore did not advocate their removal. I was also surprised to hear Dr. Crile make a similar statement. When I returned to Detroit I took the matter up and considered it with Dr. Davis. Within a very few weeks he called me into his laboratory and showed me what was very obviously a cancerous area located between the pectoral muscles. This checked up with microscopic findings. Since that time he has possibly in four cases called my attention to a similar condition of affairs.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—Dr. Erdmann has dwelt upon the points in diagnosis that can be used before the gland is removed and this is exceedingly important. He has also spoken of the difficulties in making a laboratory differential diagnosis of malignancy or nonmalignancy. Really, the difficulty sometimes is truly very great. Many pathologists believe that practically all of these malignancies begin in the ducts. Supposing this to be true, in order to get an involved section it would be important to take representative parts for microscopic study from all of the gland removed. That, of course, is practically impossible in daily routine work.

I was glad to hear Dr. Brown call attention to extension of the disease into the muscle. I will ask Dr. Erdmann to speak about this involvement as an influence upon the ultimate prognosis. I believe when the tumor has invaded the muscle a poor prognosis should always be given. That metastasis does involve the muscle more frequently than many writers and workers have supposed, I am thoroughly convinced, and I have in my laboratory abundant proof of this fact.

In regard to the treatment by the x-ray or radium, and also the examination of the tissue section after treatment has been given; the difficulties in the way of successful treatment may be very great because the cellular pictures brought about by the ray are of such a character that the detection of physical and chemical changes in the cells is easily made but there is no way of telling when the cancer cell is killed.

I have a very excellent histologic example of an unsuccessful treatment. In

this section are two nests of cells beginning growth. This breast was treated by the direct method, and a section was taken eleven days after the fourth radiation. Had this section been obtained a few days earlier the growing cells would not have shown at all, and the pathologist would have been justified in returning a diagnosis that the cancer cells had been killed. They were not killed as these later developments show.

DR. JOHN W. KEEFE, PROVIDENCE, RHODE ISLAND.—With reference to re- moval of the pectoralis major, any surgeon who has operated many times on carcinomas of the breast has seen involvement in the muscle structure, often- times beneath the fascia covering the muscle. To my mind the pectoralis major should be removed in every instance for, as the writer stated, the motion of the arm is limited to a slight degree, if any, by its removal.

I feel the public should be educated to know that any growth or swelling of the breast should be investigated by some competent physician. Dr. Erdmann seems to think that some people have had unnecessary fear. This may be true, but the good, to my mind, that will come from the education of the public will be more than counterbalanced by the fear some people may have. I have had a few instances, however, where knowledge of that condition did not seem to impress the patient. I saw a woman recently who had had her breast removed by another surgeon six years previously, and she came to me with a carcinoma of the opposite breast. She had allowed eight months to elapse after she had first noticed the swelling in the opposite breast. I had another patient within a year who, although she noticed the growth of the breast in February, delayed operation until July, so that it is a rather difficult problem to educate people so that they are sufficiently impressed to have the trouble attended to at once.

DR. GORDON K. DICKINSON, JERSEY CITY, NEW JERSEY.—Just over the pectoral muscle is the broad deep fascia of the body, which is a subsoil for in- filtration for cancer cells which may spread in all directions. It is generally a barrier for quite a while; the cancer cells may spread along the lymphatics, and that is why in going down over the epigastrium and taking up the fascia and re- secting it we have a certain amount of controlling influence over this infiltration. My pathologist has more than once shown me cancer cells in the pectoral muscle underneath the fascia. Heidenhain says they do exist and proves it, and so does Handley.

DR. EDWARD J. ILL, NEWARK, NEW JERSEY.—I believe in educating the pub- lic early in regard to cancerous symptoms, but the more I have been trying to educate the public to take no chances, the more I feel there is need for this kind of education. However, what we need is to educate the profession as a whole in regard to the earlier symptoms of carcinoma. In very many cases we do not ourselves get these tumors of the breast for early operation. We should get at the cases as early as possible for operation if we are in doubt. A frozen section at the time of the operation is not by any means satisfactory. I have sometimes removed the whole breast to find out afterward that it was not necessary at all. I described a papilloma of the duct before this Association twenty years ago, and I thought I was the first one to settle definitely the pathology of that form of tumor. In the fourteen cases I described at the time, there were two cases that had gone for a great many years without recur- rence. One patient was dead. I got the entire wall of the tumor. The other patient has died since, and she has had a growth for thirty-five years and has never had any difficulty. So no doubt a great many of these cases recover. At the time, in talking to some of the older members, they remembered two such car-

cinomas. I have seen one papilloma. The condition is rather different from a nonmalignant papilloma. Its fixation in the tissues around it is very early. The character of the fluid that comes from the nipple is quite different. It is usually more bloody and contains many cells that do not occur in a simple papilloma. The fluid in a papillary cystadenoma (nonmalignant) is of a more serious character. It contains a few leucocytes and some black glandular matter, while in the midsection of the tumor one invariably finds epithelial cells in more or less large numbers and a larger number of blood cells.

I feel like some of the other speakers do, that we must remove the chest muscles with the breast and in one piece. I believe that the whole axilla, all the muscles, must be removed without touching the tissue between the original tumor and the axillary cellular tissue. The moment you cut through between the two you infect everything. I have been able to dissect out the lymphatics in the form of a V-shape, showing malignancy. But how are we going to continue? On my return from Erlangen, I was surprised at the amount of work (nonoperative) they have done there for the cure of cancer. I have had a chance to examine a cancer of the rectum where we had a definite history about two months ago, and the cancer has entirely disappeared. It is not enough to use four radiations. They use an apparatus that carries 280,000 volts and keep the patient under this from two to eight hours; then they nurse the patient for six weeks and repeat the radiation once.

DR. ERDMANN (closing).—From the tenor of the remarks that have been made, I have been misunderstood in regard to the question of muscle excision. I distinctly stated that I do not always remove the pectoralis minor muscle, but I always remove the pectoralis major. I have never seen metastases in the muscles of the chest wall, except where the tumor operated on, primarily invaded the pectoralis major or minor. None have returned to me in that condition. In a freely movable carcinoma of the breast, where there is no adhesion of the chest wall, as I stated, I have not seen muscular implantation. The implantations or metastases have been more frequently those in the spinal column, the bone metastases causing pressure on the nerves of exit. A number of patients have been treated for sciatica after the operation. It is a metastatic pain and not a sciatica due to the involvement of the patient's constitution. I have seen pressure on the thoracic nerve, and I recall one patient who died six hours after the injection of Beebe's serum. This patient had thoracic involvement. Only one dose of the serum was given. She had been in excellent condition before she got the dose of serum.

With reference to the statements made by Dr. Keefe in regard to cancer propaganda, I do not wish to be understood as not believing in cancer propaganda, because I am a firm believer in it. When women present themselves with tumors of the breast, either involving one breast or the other, we advise them to have these tumors removed at the earliest possible date, but we know it takes months for people to get rid of the propaganda scare.

With reference to the frozen section, I fully agree with Dr. Ill. There are times when a frozen section is reported negative, and the pathologist at the hospital may take a week or ten days before he tells you that the tumor is not malignant, and finally he may come to the determination that it is malignant. In one case of fat necrosis of the breast we had the patient on the operating table mentally nine different times within a week. The conclusion reached was that the tumor was not malignant. The patient still lives, now over a year, without any evidence of malignancy. When the report is negative and you think you have the question of malignancy to contend with, it is better to remove the tumor.

Dr. G. K. Dickinson, Jersey City, N. J., presented a paper entitled **The Cervix as a Focal Point of Infection**. (For original article see page 124.)

<p style="text-align:center">DISCUSSION</p>

DR. H. WELLINGTON YATES, Detroit, Michigan.—Interest in the paper lies in local infection disseminated in this way and giving rise to general symptoms. It is interesting, inasmuch as we have had very little of this particular section of the genitourinary system called to our attention as a cause. Were it not for the fact of one or two repetitions of the maneuver he practiced, I should question whether or not the whole thing was not coincidental.

The question of operation and what should be done with many of the cases of endocervicitis is always of interest. It seems the female mind is so easily impressed by anything which we do that we should put on the soft pedal in general in questions of operation unless there is a very definite cause for it. People who have receptive minds, as most women of this type have, are easily misled and easily brought to the point in which any kind of operation would be welcomed.

Dr. Edward A. Weiss, Pittsburgh, Pa., presented a paper on **Radium in the Treatment of Uterine Hemorrhage of Non-Malignant Type**. (For original article see page 128.)

Dr. Stephen E. Tracy, Philadelphia, Pa., presented a paper on **The Present Status of Surgery in the Treatment of Fibromyomata Uteri**. (For original article see page 135.)

<p style="text-align:center">DISCUSSION</p>

DR. JOHN OSBORN POLAK, Brooklyn, New York.—There are two or three points in connection with these papers that I want to discuss. The point Dr. Weiss makes of the importance of diagnosis in cases in which radium is used is one we all admit, but we also must admit the impossibility of making an absolute pathologic diagnosis in certain cases of fibroids when we realize the number of degenerations that actually take place in these tumors. Therefore, I do not believe that any one will convince us for some time that radium is a panacea in fibroids, and that operation is to be excluded. I do believe, however, that there are a large number of fibroids and conditions met with in women with fibroids that are amenable to radium treatment. Within the last year a woman came under my observation with a fibroid as large as a four months' pregnancy, with hemoglobin of 12, whose coagulation time was 18 minutes. She was treated with a single dose of radium for 1200 mg. hours, and the hemorrhage was controlled. This was done as a temporary expedient, and followed by transfusion. The tumor has entirely disappeared. Such an instance as that makes one feel that there is a field in a certain limited class of cases for radium.

In hemorrhages of young girls, who have had repeated curettings, with particularly soft cervices the pathological examination is practically negative. Repeated hemorrhages will so reduce the patient's coagulability and blood condition that something has to be done. Repeated small doses of radium have a large field in these

cases. Some of these cases will bleed so profusely that their hemoglobin is reduced to 20 or 30, and the coagulation time will be increased to such a point that we cannot control the bleeding, and yet with 200 milligram hours, or 400 milligram hours of radium we can and do control the bleeding.

The question comes up, does the use of radium in these young girls have an influence on pregnancy? In our experience with a number of these young girls who have subsequently married, four pregnancies have occurred. None of these had radium for periods of longer than 600 milligram hours. Personally, I believe that small applications of radium have a definite effect on the uterine structure, particularly the basal membrane underneath the mucosa, and that in such dosage it does not affect the ovarian function.

There is one point in Dr. Tracy's paper in regard to hysterectomy concerning which I wish to speak. He limits total hysterectomy to patients over forty. It should be extended farther than that; it should be extended to those women who are the subjects of cervical disease, extensive trauma of the cervix, or chronic inflammation of the cervix. We were able to collect in America 256 cases, excluding the cases reported by Leonard, where cancer occurred in the cervix after the body of the uterus was taken out. These cases occurred after one year. We excluded all the cases reported where recurrence took place within a year, believing that the disease was in the cervix at the time of operation; consequently I believe that, everything being equal, where it is possible in a woman who has a traumatized cervix or an infected cervix occurring in the second period of her life, that woman should have a panhysterectomy, and not a subtotal hysterectomy.

DR. W. WAYNE BABCOCK, Philadelphia, Pennsylvania.—I was very glad Dr. Weiss brought out a strong warning against the indiscriminate and general use of radium, and particularly against the use of radium in young women and those during the period of childbirth. It seems to me, we should consider, as we always do, other measures that may, if possible, be used. There is one thing many of us have forgotten, namely, tuberculin, but for years I have been using this remedy with a great deal of satisfaction. Some of these young girls, who develop a uterine hemorrhage, are relieved if you simply take them away from their home surroundings, send them to the seashore, turn them out of doors, or send them to the mountains. Many of them are relieved without any change in the surroundings by giving them a terrific tuberculin reaction. This reaction has to be intensive. There must be a distinct temperature, and frequently the patient is ill enough to go to bed. As a rule, the effect passes off in three or four days. I have not seen any bad effects.

I was brought up in a laboratory where the fear of tuberculin was great, and the teaching of Virchow was such that for years I never thought of using it because I thought it was dangerous and improper. Then I began using tuberculin and increased it, and I have found in my experience in the last ten years no ill effects in patients who have had tuberculosis of the lungs or elsewhere. If you run through a series of cases, if you give these patients one milligram, two milligrams, or twenty milligrams, or forty milligrams to get the effect of tuberculin, you get results with a frequency that amazes you. These patients have a temperture of 101-3°; will lie down for a period; the bleeding from the reaction stops, and so, it seems to me, before we do anything in the way of local measures, these patients should be subjected to this rather simple and easily carried out measure.

An important matter is the mortality of hysterectomy for fibromyoma of the uterus. Dr. Tracy stated that it is 2 per cent. I think that is what it

should be, but in the different hospitals of the country it is not what we find it. An associate looked over the mortality after hysterectomy in the hospitals at Philadelphia during the last two years. In one hospital where there was a splendid abdominal technic, the mortality was under 1 per cent, and it has been under 1 per cent for years. In most of the hospitals of Philadelphia, and it is true of the hospital where I work, the mortality ran from 4 up to 7 per cent. Not a few of them had 6 per cent.

I think the time has arrived when associations like this should ask hospitals, who run continuously a mortality of 5, 6, or 7 per cent for hysterectomy for fibroid of the uterus, why is this mortality permitted to continue?

DR. WEISS, (closing).—I did not present this paper to advocate or endorse radium but rather to condemn its indiscriminate use. Radium does shrink tumors at times. I did not take up that phase of the subject, because such extravagant claims are often made about the disappearance of fibroid tumors by radium that the statements sound ridiculous. We should be conservative about reporting our results so far as the shrinkage of tumors is concerned. There is one common symptom we can relieve with positive assurance, and that is the control of hemorrhage to the satisfaction of the patient, physicians and associates.

In reference to the use of radium in these handicapped bleeding patients, a minimum amount of time is lost by treatment. In a patient who has been debilitated or exsanguinated, it takes some time to get her in condition for operation; her convalescence is protracted, and it is difficult to get back to her normal condition quickly. When we consider that a large percentage of bleeding tumors occur in women who are employed as teachers or in stores, the loss of time is a considerable factor to them. Personally, I never tell a patient that she will be cured by radium; I tell her we are using this agent to relieve her of this prominent symptom, bleeding, and time alone will tell what will be accomplished, and to dismiss her after treatment and say that she is cured is rather unfair. Clark in his recent analysis, after five or six years' observation of these patients, has found no secondary results, such as sarcomatous and carcinomatous changes. No one can say definitely what will happen to the fibrotic shrunken uterus. We should follow up our radium patients as we do all carcinoma cases and tabulate the results, and then we will get scientific data.

DR. TRACY, (closing).—Many papers have been written on the treatment of fibromyomata uteri by radium, some of which have been so radical as to be decidedly misleading. It is necessary to work out what cases are suitable for radium and to put the treatment on a sound basis. There is no question that radium has a field of usefulness in the treatment of these neoplasms; simple uncomplicated cases in women past forty. To eliminate the complicated cases is a question of diagnosis, and diagnosis is the crux of the situation.

I agree with Dr. Polak, that if the uterus is to be removed and there is a diseased or traumatized cervix, a panhysterectomy should be performed. In some cases if the patient is a poor surgical risk, or if the operation would be unusually difficult, it has been our custom to do a supravaginal hysterectomy and then destroy with the cautery the functionating part of the cervical stump.

DR. RALPH M. BEACH described a case of **Atresia of the Uterus.**

Miss B. W., twenty-nine years of age, was first seen Oct. 28, 1920. Her chief complaint was of periodic attacks of pain in the right lower abdomen radiating to the right side of the back. She had measles at two, numerous bilious attacks, membranous sore throat at the age of seven. Patient at 14 years of age had apparently a menstrual period of only a few spots and did not flow at all in the succeeding fifteen years, during which she had periodic attacks of pain in the lower right side and back, lasting from two to three days. These attacks would come at intervals of three to six months, beginning on the first day as a dull pain, soon changing to a sharp knife-like pain, which was severe enough at times to require morphine. These attacks were often associated with vomiting. During the past seven months, while she has been caring for an invalid mother, the attacks came regularly at twenty-eight day intervals. She has had an occasional slight white leucorrhea, but feels perfectly well and strong between attacks. Her weight has never varied much from 100 to 110 lbs. When first seen she had just recovered from one of her attacks.

Examination showed a rather slim type of girl, somewhat anemic, but apparently in fair health. Thyroid, heart, lungs, and abdomen are all negative.

The vaginal introitus admitted one finger with difficulty and there are no external evidences of infection. The cervix was small, in the axis of the vagina and did not show any endocervicitis. The uterus seemed small in size, retroverted to the third degree and could not be reposited. Patient admitted to the Methodist Episcopal Hospital for observation. Under anesthesia it was determined that the uterus was retroverted and adherent and also that there were two small masses in the culdesac, apparently ovaries.

A sound would pass but two inches into the uterus from the external os, though the uterine body seemed larger. I determined to see her in one of her attacks, and to consider the advisability of ovarian transplantation, plastic operations, etc.

She felt perfectly well until January 16, when she had another severe attack requiring morphine for its control. The abdomen was slightly tender below, during the attack, but there was no distention or rigidity or any focalizing symptoms pointing toward an appendix.

She was re-admitted to the Hospital, January 18, 1921, for operation. The urine negative, phthalein output 45 per cent in two hours. Red cells count, 4,500,000; hemoglobin, 85 per cent; white cells, 9,800; polys, 61 per cent; coagulation time, 6 minutes.

At operation a median hypogastric incision revealed a small amount of straw-colored fluid in the pelvis, with the appendix normal and high in its usual position. The uterus, tubes and ovaries were retroverted into the culdesac of Douglas and buried in adhesions. The uterus was about normal in size and the tubes were slightly distended and reddish as though they contained blood. A hysterec-

tomy and bilateral salpingoophorectomy were performed, coning out the cervix from above. The appendix was also removed.

The convalescence of this patient was rapid and she left the hospital on the thirteenth day after operation.

I have seen this girl several times since and she says she never felt better in her life. She had practically no menopause symptoms.

An examination of the specimen (Fig. 1) shows a uterus which is practically normal in size. Upon opening this in the median line anteriorly there was revealed an atresia of the cavity about one inch above the internal os. The cavity of the uterus above this contained about a dram or so of dark red fluid blood.

The tubes were dilated, sealed at the fimbriated ends, reddish in color, and contained blood. The ovaries appeared normal except that they were buried in adhesions.
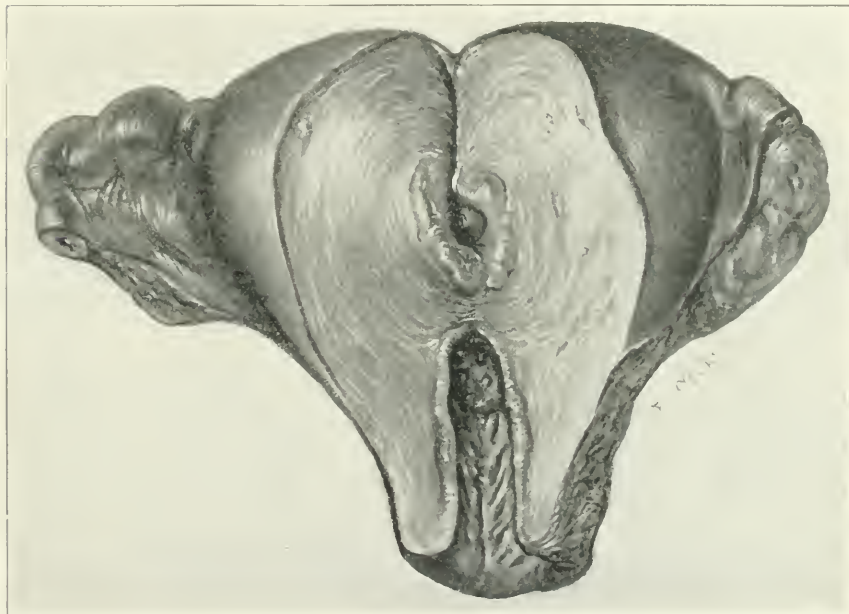
Fig. 1.

Diagnosis: atresia uteri, hematometra, retroversion, bilateral hematosalpinx, pelvic adhesions.

A survey of the literature reveals an almost endless number of articles on atresias of the vagina and cervix, and a corresponding scarcity of references to atresia in the body of the uterus.

It would seem most likely, in this case, that the atresia was due to infection in childhood, either from the measles or the membranous sore throat.

DISCUSSION

DR. E. A. BULLARD.—Some years ago a case very much like this one came under my observation, and before reporting it I decided to examine the literature. I believe these cases will become rarer, for the common cause of atresia of the cervix and of the uterus, I found in a great many cases, was either sepsis, or the result of measures which are now outworn, such as the use of live steam in the uterus, pure carbolic acid or strong zinc chloride solutions.

DR. I. C. RUBIN.—I would like to ask Dr. Beach whether the tubes were probed in order to determine the location of uterine ends. One thing is suggestive, and that is there may have been a small uterus and on top of that perhaps an adenomyoma, which can show bloody changes in its interior, not infrequently seen with blocking of the uterine ostia on both sides causing a hematosalpinx. It would be essential, I think, in order to exclude that, to pass probes through the tubes in order to see whether they are continuous with this cavity or not.

DR. RALPH M. BEACH.—I found numerous cases in the literature of atresias, but there are very few in virgins. I am doubtful whether this case was due to infection in childhood, from this so-called membranous sore throat, or whether it was possibly a congenital atresia with primary menstruation and passage of blood out through the ends of the tubes with consequent development of adhesions in that location. I tried to elicit a history of trouble in this girl when she was 14 and had this primary menstruation, but there was no story of anything that looked like a peritoneal leakage of blood at this time, so we must consider it, I think, a case of atresia, the result probably of membranous sore throat.

I did not probe the tubes. It seemed logical that we had a hematometra and probably the hematosalpinges were due to a blockage, the blood passing on into the tubes.

DR. WILLIAM A. JEWETT presented a report on the **Management of the Placenta in Abdominal Pregnancy**. (For original article see page 176.)

DISCUSSION

DR. G. W. KOSMAK.—Dr. Jewett is to be congratulated for his courage in allowing Nature to take her course in this case.

We have had sufficient evidence to know that the placenta can be left in situ safely with less danger to the woman than removal by forcible means. The fact that such a good result can be obtained shows how much the natural forces of the body are capable of in restoring a more or less normal condition.

In connection with this I want to refer back to the case presented by Dr. Beach, in which that view of the matter was evidently not taken. I did not participate in the discussion of that case because I didn't see the specimen until after the discussion had been closed, but it seems to me in that case Nature might have been given an equal chance. We had here a young girl. She had enough normal endometrial tissue in that uterus to permit of the menstrual processes taking place, as was proved by the subsequent examination of the specimen, and it seems to me that a thorough exploration of the interior of the uterus would have shown the presence of that atretic area. A plastic operation relieving this stricture might have resulted in restoring the menstrual function. The fact that the tubes were simply filled with blood speaks for the fact that recovery would have taken place because we know that tubes which are the seat of a hematosalpinx do recover in the course of time, and I claim therefore, that in this case a trial should have been made of more conservative methods of treatment along the lines of those referred to by Dr. Jewett.

DR. H. E. LINDEMAN.—This case places on record another instance of the conservative method of treating the placenta and membranes in cases of abdominal pregnancy.

Dr. Jewett mentioned the possible complications such as sepsis, hemorrhage, etc., but there is one complication which he did not mention that I saw within the last year. The past history of the case is unimportant, but a definite diagnosis of abdominal pregnancy was made. Dr. Brettauer operated, and on opening the abdomen there was a distinct sac about the size of a grape fruit with a living four months' fetus in it. The placenta, which was about 10 centimeters in diameter, was adherent to the left tube, the posterior surface of the left broad ligament, the left side of the uterus and the left part of the pelvic wall close to the infundibulopelvic ligament. The pregnancy had apparently been a continuation of a tubal abortion on that side. The sac and placenta were easily stripped out and there was no hemorrhage. The fetus was definitely alive after delivery. Dr. Brettauer resected the tube and ovary and part of the broad ligament on the left side, and then whipped over the cut surfaces and closed the abdomen without drainage. The patient did very well the next day. The following day she developed symptoms of intestinal obstruction, and on re-opening the abdomen, massive adhesions of the small intestine and sigmoid with distinct double-barrel angulation of the sigmoid were found, and although this was relieved, she died within an hour of the operation.

DR. A. C. BECK.—I was present at the time Dr. Jewett did this operation and the case with which it was done was greatly in contrast with a previous case at the Long Island College Hospital, where the placenta was removed practically from the same site. There were 12 cases similar to the one reported by Dr. Jewett up to the time that I went over the literature on this subject. Of those, eight survived. Two died directly after operation from sepsis that was apparently present at the time of operation. This was a favorite procedure of the Italians about 1895.

DR. W. M. FORD.—In support of Dr. Kosmak's position, I would like to say a word in reference to the case of atresia of the uterus. Like Dr. Kosmak, I did not see Dr. Beach's specimen until after the discussion closed. The appearance of this specimen suggested a similarity between it and the case to which I wish to call attention. This patient came under observation about a month ago. She had been curetted for sterility and subsequently failed to menstruate. For several months she believed that she was pregnant and when a year and a half elapsed and she had had recurrent sensations of pelvic congestion and distress, without delivering herself of a child and without any evidence of menstruation, she sought relief by consulting Dr. Flint. He was unable to pass a sound into the uterus and made a diagnosis of atresia. The patient entered St. Bartholomew's Hospital and under an anesthetic very little difficulty was experienced in passing a sound into a markedly retrocessed but not retroverted uterus. With very little difficulty the stricture, which was apparently complete, was overcome with the sound and Peaslee dilators. A stem pessary was inserted and the woman is just beginning to menstruate without difficulty. This case is similar to the one presented by Dr. Beach and suggests the possibility of less radical means accomplishing the more desirable end.

DR. BEACH.—When I took this patient into the hospital the first time, we attempted by forcible means to pass this obstruction. This atretic area was certainly three-eighths of an inch wide at the time of the operation. It is true as the findings show here, we have a wide atretic band, and but a small uterine cavity which did not hold even a dram of blood. In other words, apparently the anterior and posterior walls of the uterus are adherent. In addition, this uterus was in the culdesac and was completely buried in adhesions: the tubes and ovaries were totally adherent. It was a case such as you see as the end-re-

sult of an inflammatory condition and called for removal of the uterus, tubes and ovaries to cure the patient. We tried to pass the stricture at the time of anesthesia, but without success. In looking into the abdomen with everything plastered down and adherent, it seemed to me the one chance the girl had of a cure was to take the uterus out.

DR. F. A. DORMAN.—I think this case of Dr. Jewett's is of a good deal of value to us because it is a dangerous thing to attempt the removal of these very difficult adherent placentae, and if they can be tolerated in this way and if time shows there is no infection present, it is the logical thing to do. I hope, however, that this will not deter the operator from removing placentae where there is a possibility of discovering a hemorrhage and controlling the bleeding because it is a much more normal thing than to leave a woman with a foreign body in the abdomen.

DR. WILLIAM PFEIFFER presented a case report of **Cesarean Section Following Coffey Plication of the Round and Broad Ligaments.**

Mrs. C., age twenty-nine, was seen in consultation with her physician September 15, 1922, and gave the following history. Her chief complaint was abdominal pain during pregnancy. She knew of no illnesses of childhood except pertussis. As an adult she complained frequently of some ill-defined gastrointestinal trouble producing intestinal fermentation and causing syncope. Appendix removed six years ago and was drained for a few days.

Menses began at 16, established at once, of irregular habit, the interval usually of five to six weeks, but occasionally four weeks; six to eight days' flow, amount profuse, not clotted; seldom any pain, but when present was in sacral region. No leucorrhea until after last delivery. Date of last menstruation sometime in February, 1922. Patient was married seven years. Three previous pregnancies terminating six, four and two years ago, the present pregnancy being the fourth. All pregnancies accompanied by occasional attacks of syncope. All deliveries were spontaneous and she was not lacerated until the last delivery; this was not repaired until later. The child died of pneumonia at one and one half years of age.

Following the third delivery there was considerable pain in the lower abdomen and back and a sensation of loss of support at the pelvic outlet, all of which were worse at time of menstruation. Leucorrhea was considerable. Correction of these conditions by operation was advised and this was done in October, 1921, by a very competent general surgeon. There was some relief obtained for a short time. Menstruation in January, 1922, was considerably prolonged and the one at an uncertain date in February was the last, conception probably occurring soon after its cessation. Almost immediately pain returned, located in lower abdomen and back and severe enough to incapacitate so that the patient was obliged to remain in bed for five weeks. Vaginal discharge of thick mucus, greater in amount than before operation was an annoying feature. As the uterus enlarged, pain appeared in the umbilical region, and finally in the epigastrium, though the greatest intensity at all times was in the inguinal regions; the pain was constant with periods of exacerbation. She was never well subsequently but was up and around until seven weeks before admission to the hospital when the increasing severity of the abdominal pain caused her again to seek her bed. Codeine and morphine were the only source of relief. Constipation was present though not obstinate; sleep was indifferent, appetite poor, and altogether the patient was a very miserable woman.

Physical examination on September 15, 1922, showed an adult female of spare figure and unhappy countenance. Head and neck negative; some carious teeth; nose normal. Heart and lungs normal. The abdomen was enlarged by a pregnant uterus about the size of a seven months' gestation. Presentation cephalic and fetal heart heard. There were two scars in the abdominal wall, one in the right lower quadrant and the other in the midline below the umbilicus. The entire abdomen is extremely
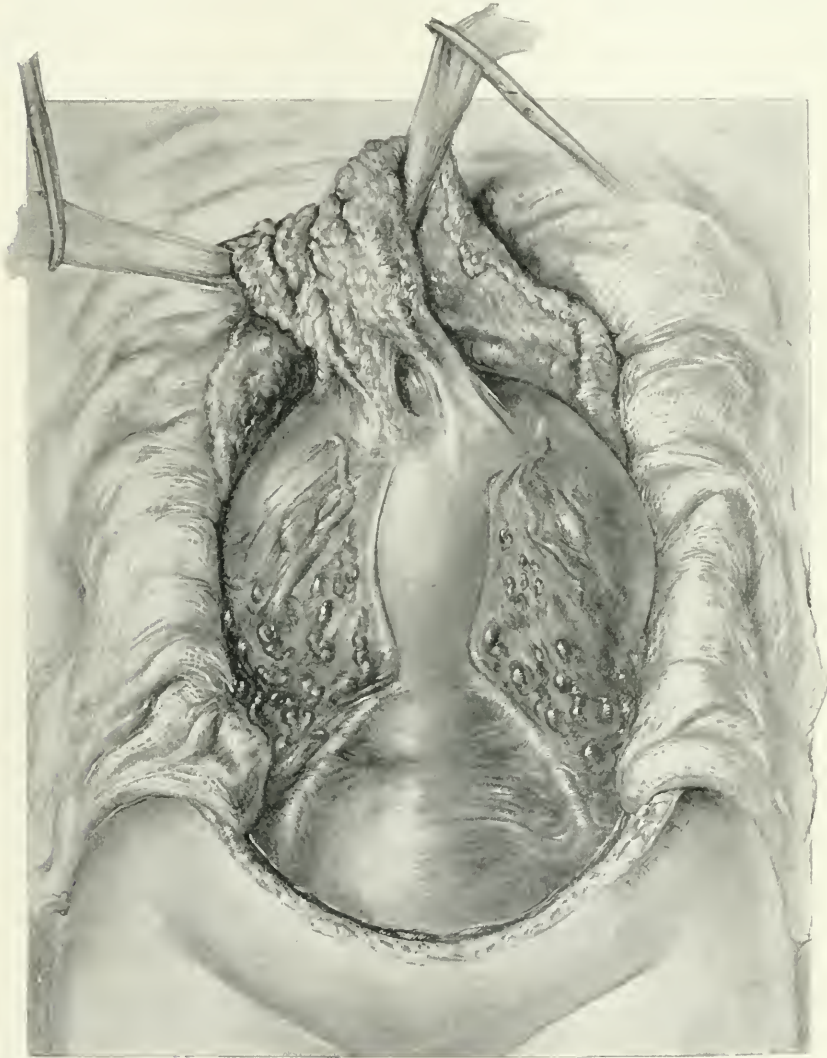
Fig. 2.

sensitive without rigidity and palpation of the lower half caused marked discomfort greatest near Poupart's ligaments.

At this time the type of operation was not known to me but it was believed that the condition was one due to some form of fixation. It was determined to follow an expectant plan, if possible, in the interests of the fetus until pregnancy had entered the ninth month, and this was done, though not without repeated

requests for relief from continued and increasing suffering. In the meantime a communication was received from the surgeon who had operated upon the patient in which he said he performed "a curettage, perineorrhaphy, removal of the greater portion of both ovaries for fibrous enlargement, and a Coffey suspension of the uterus for retroversion." He adds, "Her follow-up notes show that she continued to have backache and headache."

Operation performed on October 12, 1922. A six-inch incision slightly to right of midline, half above, and half below umbilicus. On opening the peritoneal cavity the omentum was found adherent to the uterus in three or four places anteriorly and near fundus. The broad ligaments were quite thin at their su-
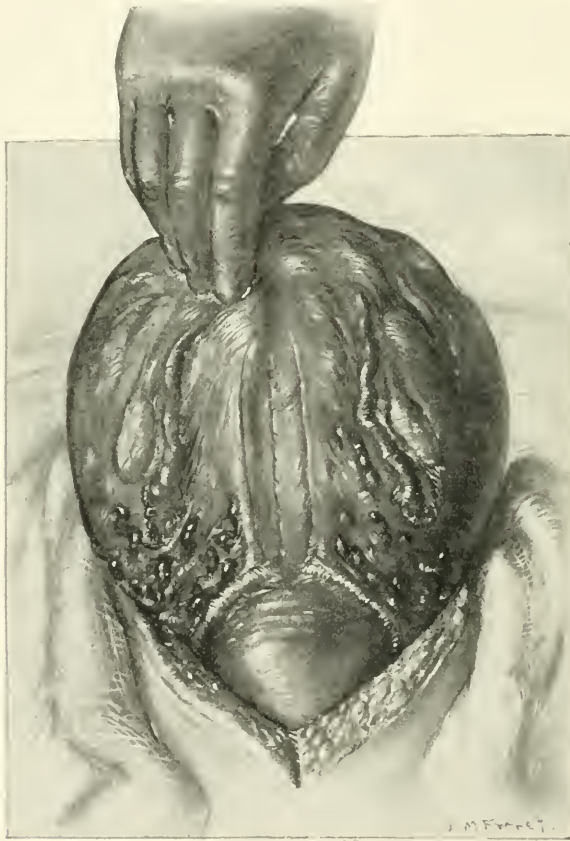
Fig. 3.

perior margins and reaching to within two inches of the fundus; they were felt as distinct though thin bands to the sides of the uterus and about three inches distant from each other measured across the anterior surface of the unopened uterus; the portion of the round ligament infolded could not be palpated in the thinning of the tissues to the sides of the uterus. (Fig. 2.) The tubes were drawn closer together than normal. The round ligaments running outward from the sides of the uterus were much enlarged, reached but half way to the fundus and formed an acute angle as they were approximated on the face of the uterus. Numerous varicosities, some as large as the little finger, were general throughout the broad ligaments. In the lower segment of the uterus the broad ligaments were ex-

tremely tense and not as much thinned as above. The omental adhesions were tied off and the usual type of section done. After closure of the uterus an attempt was made to deliver it to study conditions more thoroughly and to determine the further procedure, but this was found impossible because of the tension of the broad ligaments at the lower uterine segment. Only could this be done after the incision in the abdominal wall was extended inferiorly. (It will be recalled that the patient's discomfort was greatest in the hypogastric and inguinal regions). It was seen then that in the uterus now closed the broad ligaments were within one inch of each other in the midline, reached but two-thirds the distance to the fundus and were very tense below even in the smaller emptied uterus; the round ligaments now almost met. (Fig. 3.) It was felt wiser not to attempt to remove the broad ligaments from the face of the uterus as it would leave a raw surface of such size that peritonealization would have been practically impossible, hence the abdomen was closed with the decision to do a hysterectomy later on if pain recurred.

DISCUSSION

DR. A. B. DAVIS.—In looking at the pictures it seemed to me that the method of Coffey suspension was much exaggerated and the forward pull on the uterus by the round ligaments carried too low down toward the lower uterine segment.

Years ago, when suspensions and fixations were done rather freely on women in the child-bearing period, we were called upon to perform cesarean sections on quite a number. I did ten cesarean sections with this as a decided indication. two of them were cases of my own in which I had done a Kelly suspension, in which a band developed and distorted the axis of the uterus so that the force of the labor was against the lower uterine segment, posterior, and the cervix in one case was turned far up in the right iliac region. In that case before the cervix could be found, an anesthetic had to be given. In one case an interposition operation was done and the patient became pregnant and continued to the fifth month. Of late years I have not seen any of this class of cases but a considerable number of patients come under my observation for whom we are obliged to do some form of suspension. I have followed the Coffey method with some modifications in occasional cases, carrying the round ligament plications well up and attaching them near the fundus in front. These cases go through pregnancy without disturbance and are delivered often without difficulty and leave the suspension in good condition. In cases in which uterine support is stretched or lax and fails altogether to function, allowing retroversion and descent of the uterus, by shortening these supports and bringing the uterus up where it belongs normally, a strain is taken off these supports and they regain their tone and efficiency. This operation does not interfere with subsequent delivery. It is possible that in some cases the first stage of labor is somewhat slower. A few days ago I delivered a patient who had been subjected to a vaginal plastic and suspension operation by a general surgeon, which, happily, must have been very skillfully done, although I did not open the abdomen, but from the appearances it was a Coffey suspension. The cervix did not dilate well. The woman had a good many hours of ineffective labor, the child's heart began to show the strain, meconium was coming away in a vertex presentation. I did a very easy version and breech extraction of a living child. To all appearances the suspension of the uterus was in no way interfered with by this pregnancy and delivery.

Dr. Pfeiffer shows the folding over of the round and broad ligaments on each side well toward the midline from the fundus down the anterior wall of the uterus with round ligament showing—exerting its pull far down near the lower

end of the uterus. I think that the location of this traction of the round liga-
ment as shown, is a mistake. It should be well up near the fundus. It is to
be noted that omentum is adherent to the fundus as though the uterus had
been grasped at this point during operation and had left small wounds favoring
such adhesions.

DR. H. E. LINDEMAN.—From the illustration, I do not believe that this is
a properly executed Coffey operation. In Coffey's original paper, as well as in his
second paper, the operation which he described is entirely different from the
illustration shown here. In that operation, after suturing the round ligaments
down across the anterior surface of the uterus, he brings them back again to
the fundus, and as he described it, the broad ligament is folded down with the
round ligaments and sutured into place. Later the ligaments spring back to
their original position, so that if the operation had been properly performed in
this case that would have been the mechanism and the round ligaments would
arise from practically their normal origin and course outward to the internal
rings instead of arising from the anterior surface of the uterus about two
inches below the fundus as they do in this illustration.

If this were a case of posterior sacculation of a pregnant uterus, as in ventro-
fixation, the round ligaments would still follow a course from their normal site
of origin with the broad ligaments from close to the fundus and not from way
down on the anterior surface of the uterus.

DR. WILLIAM PFEIFFER.—I think if the doctor had done as Dr. Davis sug-
gested, namely, brought the round ligament back to the fundus, the trouble
would not have happened. This operation was done by a general surgeon in an
institution where there is no gynecological service. Probably that makes a great
deal of difference. Nevertheless, the picture shows accurately the operation as
outlined by Coffey in the Year Book for 1911, and the last step was to bring the
round ligament down to the inferior angle, and not to the fundus.

DR. GORDON GIBSON read a paper entitled **A Clinical and Pathological
Study of the Non-Surgical Cervix.**

DR. GIBSON called attention to the fact that a great deal of needless surgery
was being done on the cervix of the child-bearing woman, and also that a large
number of cases were called endocervicitis which were not true endocervicitis in
that there was no infection present, but that the symptoms which brought the
patient to the doctor and the physical signs which he found on examination were
due quite often to passive congestion rather than to infection.

This should stimulate a more careful investigation of cases with an at-
tempt to classify the process present rather than to dismiss it as a lacerated cervix
and to treat it for the laceration alone. As the investigation progressed he be-
came more and more impressed with the fact that the degree of the laceration
had very little to do with the pathologic process in the cervix, marked changes
and pronounced symptoms being present with very slight lacerations and at
times no changes in the cervical tissue, *per se*, when deep bilateral or multiple
tears even extending into the bases of the broad ligaments were present. It was
found that, irrespective of the presence of, or of the degree of, tears, the changes
were of two kinds, those due to passive congestion and those due to infection
of the cervical glands. He then tried to classify in his own mind just what type
of cervix demanded operation in a woman in the child-bearing period and which
type or types could be treated so that the woman would be relieved of her symp-

toms and be able to bear her children. This presented several difficulties as no two patients are alike and there are many types of clinical pictures. It seems to him that the main indications for operation on the cervix during the child-bearing period were (1) marked hyperplasia, whether due to passive congestion or to infection, and (2) extensive tears with infection of the cervical glands.

This left then for treatment cases where there was passive congestion of not sufficiently long standing to cause hyperplasia, and cases where infection was present in nonlacerated or moderately lacerated cervices where it was the infection that was giving rise to the symptoms and physical signs and not the extent of the laceration and which, if neglected, would soon become hyperplastic and demand operation. There are then two types of cervix which may be called non-surgical or nonoperative and it is the management of these that is up for discussion.

The cause of the congestion in the noninfected cases was found to be, in the majority of instances, relaxation of the pericervical tissues. Careful examination reveals that the uterus as a whole has an increased mobility often to a very marked extent. Unless an attempt is made to determine this increased excursion of the uterus the condition will be overlooked, as the cervix is often in normal position with the body of the uterus forward when the patient is in position for examination. This relaxation allows the uterus to fall low in the pelvis when the woman is on her feet thereby causing a circulatory unbalance with resulting passive congestion. Pathologists are divided in believing that long-continued hyperemia will cause hyperplasia of the connective tissue but there seems to be enough clinical evidence to warrant the belief that it does.

It was found that if this circulatory unbalance be removed early enough, the cervix will involute to almost its normal state. In Dr. Gibson's hands the most efficacious method to restore the circulatory balance is to fit a proper pessary, thereby removing the drag on the pelvic structures. The majority of these cases have erosions of varying degrees which are removed by brushing over with the cautery blade. In this type of case the cervical glands are not diseased, only being more active because of the increased blood in the tissues.

The treatment of the second class of cases, that of the infected cervix with no laceration or moderately lacerated in which there have been no hyperplastic changes, no method has given such satisfactory results as has the electric cautery. The gland bearing area of the cervical mucosa can be removed by careful systematic applications of the cautery blade. A great deal of care must be taken and the method demands a good deal of patience on the part of the doctor and the patient. A good deal of time may be spent in effecting a cure of the condition but it seems to be better to spend this time rather than to do an operation for the removal of infection while the woman is still in the child-bearing period.

It is quite true that there are often associated lesions which in themselves demand operation. Here again a thorough cauterization of an erosion or of an infected canal with moderate laceration when one is doing an operation for, say, retroversion and lacerated perineum, will leave a cervix which is better able to functionate than one which has had an operation for the removal of an infected canal. Among the last 1000 patients seen in the Polhemus Clinic there are 38 who have been cured of a gonorrheal endocervicitis. This number may seem small but it means that there are 38 women who have an intact cervix that is able to functionate.

We are often asked how we differentiate between the cervix with passive congestion and the one which is infected. The congested cervix is large, soft and boggy and is freely movable. It is dusky in color, there are no cysts, there

is generally erosion and the discharge is more mucoid than mucopurulent in character. The predominating microorganism in the cervical discharge is the micrococcus catarrhalis. The infected cervix presents much the same appearance but is tender and there is invariably some limitation of motion accompanied by pain due to the pelvic lymphangitis. There is redness rather than a dusky hue and the discharge is distinctly purulent in character. The predominating organisms are the colon bacillus, staphylococci, streptococci and gonococci. The tenderness of the uterosacrals has been attributed to parametritis by many but it seems to me to be due to a pelvic lymphangitis analogous to lymphangitis of the arm and tender glands in the axilla in the presence of an infection of the hand. When the infection disappears from the cervix the tenderness in the pelvis disappears just as it does with the hand.

DISCUSSION

DR. W. P. HEALY.—It seems to me that we have to consider primarily one other factor and that is the age of the patient in deciding the method of handling the diseased cervix.

There is no doubt in a society or organization of this kind that every man is agreed that the cervix should be conserved in the young women for its functional use if pregnancy is to take place, but in the older woman getting beyond the child-bearing period who may have the same type of diseased cervix illustrated here, it seems to me the wiser plan is to remove the cervix by trachelectomy because the question of pregnancy can be, to a larger extent, set aside; and then we must begin to consider the question of the development of cancer in a diseased cervix.

With regard to the use of the cautery, I believe that more and more those of us who deal with diseased cervices will use the cautery.

I would like Dr. Gibson, in his closing of the discussion, to tell us more definitely whether this application of the cautery that he speaks of as brushing, is done at only one sitting or whether it is an application that takes place several times in his cases.

For a good many years, I have been cauterizing diseased cervices in young women, but very much more strenuously than Dr. Gibson has indicated here tonight. I have very definitely cauterized them completely about the cervix and always deeply into the cervix so that there will be at least eight grooves in the cervix, three in front, three in back and one on each side. When we have finished that type of cauterization we have a very bad looking cervix and it will be questionable in the minds of those who don't cauterize strenuously whether that is desirable or not. I am speaking now of the cystic cervices, where you wish to conserve the cervix in the young woman. If you will try that form of treatment I am sure you will, in most of those cases, be gratified with the condition of the cervix at the end of eight weeks' time. The patient will have a good deal of discharge, in the eight weeks following the operation, but the condition gradually clears up, and at the end of that time she should have a cervix that will function, because in the last seven years quite a fair percentage of those young women have conceived more than once and gone to term and been delivered without undue complications from the cervix.

I believe it is easier to cauterize these cervices than to operate on them.

In the presence of a markedly diseased cervix I believe that the patient should be under an anesthetic so as to carry on vigorous cauterization.

I endorse what Dr. Gibson said about the methods of treatment of the other cervices where there is edema. I believe they are best treated in the manner which he described.

One more word in connection with the edematous cervix: nearly all of those I have seen have been in subinvoluted uteri following pregnancy in which the obstetrician has not followed up his patients and put in a pessary, which would have prevented this.

DR. GORDON GIBSON.—Dr. Healy spoke of the age of the patient. When discussing this subject I did not refer to that because I thought perhaps it would be inferred, but, we are referring to the child-bearing period of life. The woman with a diseased cervix who is through having children is very much better off with her cervix repaired.

Dr. Healy brought up the subject of cancer. I think we are gradually going to give up this fad that every woman should have her cervix fixed, as otherwise she is going to have cancer. If that were true, pretty nearly every woman who bears a child would have a cancer. I do not believe that should be the reason for operation.

If there are infections or extensive lacerations, they are better operated upon. Each case presents its own problem. I think that a great many women are unnecessarily frightened because they are told they may possibly develop cancer.

As to the question of the number of applications by this method, one brushing in the presence of slight erosion will remove exfoliating cervical mucosa.

As you go up into the cervix deeper cauterization is necessary. If you give the patient an anesthetic, one deep, thorough cauterization will cure the cervix. Sometimes it can be done with two or three applications in the cervix, and sometimes it takes longer. It all depends on the severity of the case.

The main thing is that with the cautery you have to think. So in these cases, any cautery will do the work if you are thinking of what is going on at the other end of the cautery.

NEW YORK ACADEMY OF MEDICINE

SECTION ON OBSTETRICS AND GYNECOLOGY
STATED MEETING OCTOBER 24, 1922.

Dr. William E. Caldwell in the Chair

Dr. Leonard Rau reported a case of **Full Term Extrauterine Pregnancy. Living Child. Specimen of the Uterus.**

Mrs. F., aged twenty-seven, mother of one child. Her last menstruation occurred Jan. 14, 1922. In the second month she had a fainting spell and severe pains in the right side, lasting for several weeks; after that she was quite well. The speaker saw the patient on Oct. 1, 1922, and on examination found the head of the child on the right side, high up, the feet being in the region of the spleen. Fetal heart sounds were heard near the umbilicus. Internal examination revealed no presenting part. The cervix was felt high up on the left side. A diagnosis of extrauterine pregnancy was made.

Operation was performed on Oct. 4, 1922, at St. Joseph's Hospital, Far Rockaway. On opening the abdomen the sac ruptured. The fetus was found under the ribs. The cord was ligated, the child was extracted and easily resuscitated. The child had a ridge on the right side of the head, and a deep depression in the lower right maxilla, with contraction on the right side of the neck. The placenta was adherent to the uterus, and the sac to the cecum. Owing to adhesions and hemor-

rhage, it was decided to do a hysterectomy and to remove the sac, placenta and uterus en masse. This was done without much difficulty. The appendix was embedded in the sac and was removed with the mass. Convalescence was uneventful. The patient left the hospital on the fourteenth day, with the wound completely healed. When last seen, one month after delivery, mother and child were in excellent condition.

Dr. Royal C. Van Etten also reported a case of **Full Term Extrauterine Pregnancy with a Living Baby.**

A colored woman, aged twenty-four, was seen at the antepartum clinic at Sloane Hospital, Dec. 12, 1921. She had been married 1½ years, was well, her periods had been regular and normal, and she gave no history of previous illness or operation. She had given birth five years before to a seven months' baby which died the day of birth. Her last regular period was June 11, 1921; it was followed by "spotting" in July. Quickening was noticed on October 12, making her due April 18, 1922. She had been in one of the New York hospitals from September 26 to October 21, 1921, complaining of pain in the left lower quadrant and dysuria; no flowing and no fainting. She ran a temperature of 99° to 100° for two weeks. Her blood count showed 11,700 leucocytes and 86 per cent polys. Wassermann was negative.

The diagnosis at this time was either: (1) Normal pregnancy, 3 months, with fibroid. (2) Normal pregnancy with salpingitis. (3) Ectopic gestation, left.

She was discharged as a case of normal pregnancy with salpingitis, and a reference to a mass on the left was made. This was to be watched at the time of labor.

On December 19, at our clinic she was complaining of a slight pain in the lower abdomen. The position of the fetus was transverse. Her Wassermann was 4 plus and she was given one bottle of mixed treatment during her pregnancy. Subsequent visits to the clinic were on January 9 and January 20, 1922.

On Feb. 3, 1922, the patient was admitted to Sloane Hospital complaining of pains for the past few hours; these were noted as labor pains. She had had pain for several days whenever the baby moved. The cervix was long and patulous. It was thought that she would probably deliver if the baby were not too large, though she had a generally contracted pelvis, with a diagonal conjugate of 10 cm. The child was in breech presentation. Were it not for the positive Wassermann we would have advised cesarean section at term. On February 14, patient was discharged from the hospital. On February 21 and 28, she was seen at the antepartum clinic. On March 8, she was again admitted to Sloane Hospital, complaining of severe abdominal pain. She was examined under an anesthetic and cesarean section advised, because it was thought she had fibroids and a breech which, with her small pelvis, would prevent delivery.

March 10, 1922.—Examination under ether disclosed a "fibroid" in the posterior wall of the uterus. The abdomen was very tense. The position of the child could not be determined. It was believed that the fibroid was obstructing labor.

Operation.—Midline incision in the abdomen below the umbilicus. On opening the peritoneum a large amount of fluid was evacuated; the shoulder and arm of the child were then presenting. It was found to be a full-term extrauterine pregnancy. The fetus was delivered with a few stringy adhesions to the omentum and small intestine. The placenta was found on the left side and was attached to the left tube, left ovary and left mesosalpinx. It was easily delivered into the abdominal wound. The left tube and ovary and the left infundibulopelvic ligament were

ligated. The placenta was removed. No evidence of rupture of the left tube could be made out. The abdomen was closed by using continuous plain gut for peritoneum and muscle; figure-of-eight silkworm-gut retention sutures for skin and fascia; locked iodized continuous sutures for fascia; and continuous locked silk for skin. No drainage.

The child was a male, weighing 8 pounds 2 ounces.

The postoperative course was stormy for twenty-four hours and then recovery was uneventful. The patient left the hospital on March 31. Both mother and child were in good condition.

Follow-up.—April 12: Baby syphilitic osteomyelitis. X-ray of left knee. April 22: Baby Wassermann 4 plus. July 24: Both mother and baby Wassermann 4 plus. Aug. 7: Mother's scar healed well. Baby's weight, 14 pounds. Sept. 6: Baby treated at St. Luke's Hospital. Oct. 20: I saw the patient at her home. Mother well. Baby fine. Weight 15 pounds.

All the staffs in both hospitals except two men missed the diagnosis completely, as was the fact in a case reported in the *Journal of the American Medical Association* for Oct. 7, 1922. Here a dead baby was delivered.

Cases of this kind are still infrequent enough to make worth while reporting. This case was almost an ovarian pregnancy; but it could not be proved that the attachment to the tube was secondary. Dr. Cragin reported six cases. All the mothers lived and three babies, all slightly deformed. Since Dr. Cragin's death they had had three cases. One Dr. W. Ward delivered in 1919. Mother and child lived. The placenta was not delivered at the time of operation. We had one case with a macerated fetus in 1920, and the above case. In all 290 cases have been reported to date. Beck reported 262 in 1919.

The older treatment was to ignore the child and save the mother. This still holds true for cases up to the sixth month. If after that, we usually wait until 8 months and 2 weeks to operate, as the risk between those periods is not materially increased. The placenta is the dangerous element in all deliveries; if it cannot be freed without too profuse hemorrhage, it should be left in place. Closure without drainage with the placenta in—we believe to be a risky procedure. Rozar of Georgia estimated a maternal mortality of 11.1 per cent if the placenta can be removed; 38.7 per cent if it is left in, the mortality being due to hemorrhage and infection. There is a spurious labor at 8 months 2 weeks which is apt to kill the baby. If the fetus is dead wait two weeks and then operate.

The diagnosis is hard to distinguish from (1) fibroid and pregnancy *in utero* and (2) pregnancy with bicornuate uterus. The fetus is apt to be deformed, although our two live babies were normal.

Deavor of Syracuse has reported an interesting case where the diagnosis was made at the third month, and the woman was watched to term. Pains beginning early and continuing throughout the pregnancy; a story of fainting and pain at about the third month, and, as Auspach says, sensitiveness of the abdomen with later fetal movements close to the abdominal wall, should all lead one to consider an ectopic pregnancy as progressing toward term.

DISCUSSION ON PAPERS OF DR. RAU AND DR. VAN ETTEN

DR. ALFRED C. BECK.—At the time that I reported a case of advanced extra-uterine pregnancy before the American Medical Association I made a careful review of the literature and found 262 similar cases. Between 30 and 40 have been reported since that date so that the total is considerably higher than Dr. Van Etten has suggested. It was formerly considered that the best time to operate was as soon as the diagnosis was made. Weider of Pittsburg and the late Dr. Cragin felt

that the interests of the child should not be disregarded and recommended watchful expectancy until the 38th week. As a result of my study I found that this was the very best time to interfere in the interest of the child. The mother's interest is likewise best handled by waiting until the 38th week for actual risk from the operation is less at this time than at the 7th or 8th month. Therefore if the patient can be kept under observation the best time to operate in the interest of both mother and child is the 38th week.

The placenta has been handled in three ways. By far the best results were reported in those cases in which removal of the placenta and closure without drainage was practiced. In this group the maternal mortality was about 16 per cent. Some Italian operators in 1895 recommended leaving the placenta in the abdomen and closure without drainage. Twelve reports in which this routine was followed were found and the mortality was 33 per cent. Retention of the placenta with drainage was very commonly practiced and the mortality following this routine was about 38 per cent. From these figures I concluded that the placenta should be removed whenever it is possible to control its blood supply as in the two cases reported tonight. If the location of the placental site is such that its blood supply cannot be ligated it would seem that leaving the placenta in the abdomen and closure without drainage is preferable to closure with drainage because of the increased risk of infection which accompanies the latter routine.

DR. L. T. LeWALD.—It would be interesting to know whether roentgenological examination was made in either of these cases. It is surprising how much the x-rays have revealed in cases of this kind examined recently with the use of the Potter-Bucky diaphragm. There have been four cases at St. Luke's Hospital within the last six months. Two of these had been diagnosed as probable ovarian cysts and were about to be operated upon when the x-rays revealed the presence of a fetus of about seven months. The other two cases were x-ray negative for a fetus and they proved to be ovarian cysts at operation. If the x-ray gives an unusually clear shadow of the fetus in the absence of a secondary shadow cast by the liquor amnii one might consider this *suggestive* of abdominal pregnancy versus normal.

DR. SAMUEL J. DRUSKIN.—In reference to the diagnosis of abdominal pregnancy by means of the x-rays, some years ago I was called to see a case with an excessive amount of liquor amnii in the ninth month of pregnancy. The x-ray was negative, and I then concluded that the liquor amnii interfered with the demonstration of the fetus. But if any one has seen the plates taken by Warnekros at the Bumm Clinic in Berlin, one would notice that they show the fetus with remarkable clearness. That would lead one to conclude that the x-ray examination would be able to afford a diagnosis of pregnancy. With reference to the statement regarding the difference in the shadow in the presence of an extrauterine pregnancy, if Dr. Le Wald had seen these very remarkably clear pictures, he would also agree that even a large amount of liquor amnii does not obscure the fetus. The differential diagnosis of extrauterine pregnancy, by means of x-ray is made on other grounds. The attitude of the fetus *in utero,* is not, as is generally supposed, that of marked flexion. On the contrary, with the exception of a moderate curvature of the spinal column, the head is in a position, midway between flexion and extension, and the extremities occupy a more or less normal position. In the case of extrauterine pregnancy, however, the parts are in one mass. Given the additional fact of a body containing a fetus displacing the cervix uteri, the diagnosis of extrauterine pregnancy is a certainty.

Dr. Richard N. Pierson read a paper entitled **Cord Wassermann Statistics,** of which an abstract follows.

When is the newborn child syphilitic? This is a question not yet answered completely or to even a moderate degree of satisfaction, although it has been studied for more than a dozen years by many competent observers all over the world. A study of the literature would seem to justify the conclusion that this failure to find the answer sought, is due to the failure to study a sufficient amount of material over a sufficient period of time.

It is easy to recognize these defects of knowledge, but it is a large order to remedy them. We recognize, therefore, that we shall indeed be lucky if our work approaches in value that of many authors, the defects of whose work we have just mentioned. For the past several years, at the Sloane Hospital for Women, we have attacked this problem in the following way: (1) A Wassermann test is done on every patient admitted to the antepartum clinic. (2) All patients who show a Wassermann reaction, positive in any degree, or with a personal or family history suggestive of syphilis, are referred to our special clinic held once a week. (3) Positive and suspected cases receive intensive treatment throughout pregnancy. (4) A cord Wassermann is done on all babies in whose mothers syphilis is present or suspected. (5) The placentas of all such cases are examined microscopically for signs of syphilis. (6) All stillbirths or babies that die are completely studied at autopsy. (7) Blood is taken from the heel or vein of all positive or suspicious cases on the tenth day of life. (8) Babies who show a positive Wassermann on cord blood, receive mercury intramuscularly twice a week. (9) All babies and mothers in whom syphilis is suspected are seen at frequent intervals at follow-up, to determine the condition of the Wassermann reaction, and the presence or absence of clinical syphilis.

From this larger study we present a few facts on the cord Wassermann, with the conclusions that appear to follow. The literature is sharply divided on the diagnostic and prognostic value of the cord Wassermann. Bauer, Bar, Daunay, Jeans, Plass, Yerington, find it valuable. Fildes and Williams find it of little value. We believe that the first named authors have established their position by the facts presented. On the other hand, we do not believe that the conclusions of the last named authors are warranted because of what appears to us to be errors of control and induction in their work.

Of 300 consecutive women with positive Wassermann, 200 had either cord or heel Wassermann reaction reported. Of 183 reported cord Wassermanns, 138, or 75.96 per cent, were positive in some degree; 99, or 71.20 per cent, of the positive reactions were strongly positive; 40, or 28.80 per cent, of the positive reactions were weakly positive. Forty-four, or 24.04 per cent, were negative. Of these 44 negative cord cases, 18 heel Wassermanns were reported; 15 were negative, 83.33 per cent. Within the limits of error 100 per cent, 3 were weakly positive, 2 with cholesterin and 1 with alcohol.

Of 99 strongly positive cords, heels were done in 73. Of these 43, or 58.90 per cent, remained strongly positive; 17, or 23.30 per cent, became weakly positive; that is, 82.20 per cent, were positive in some degree; 13, or 17.80 per cent became negative. Of 40 weakly positive cords, heels were done on 23. Of these 14, or 60.89 per cent, remained weakly positive, and 9, or 39.11 per cent, became negative.

As to the effect of treatment on cord Wassermanns 47 mothers received satisfactory treatment. No babies died, yet 35 babies of these mothers showed a positive cord Wassermann, 74.5 per cent. Fifty-one mothers received poor treatment; two babies died of syphilis, yet 33 of these mothers showed a positive cord Wassermann, 64.7 per cent. Eleven mothers received no treatment; four of ten babies

died of syphilis. Ten cord Wassermanns were done; all, or 100 per cent were positive. Ninety-two mothers had no record of treatment; 57 babies of these mothers showed a positive cord Wassermann, 62 per cent.

Conclusions.—(1) When the mother is syphilitic the cord Wassermann will be positive in the majority of cases (139 of 183, or 75.96 per cent). (2) When the cord is strongly positive (43 of 73, or 58.90 per cent, remain strongly positive in the baby at the tenth day; 17 of 73, or 23.30 per cent, became weakly positive; 13 of 73, or 17.80 per cent, became negative), it continues so in the baby in the majority of cases. (3) When the cord is weakly positive (14 of 23 remained weakly positive, 60.89 per cent; 9 of 23 became negative, 39.11 per cent), it continues so in the baby at ten days in the majority of cases. (4) Neither satisfactory nor poor treatment seems to materially diminish the incidence of a positive reaction in the cord blood; 70 per cent of such cases show a positive cord. (5) The few cases known to have received no treatment (10) showed 100 per cent incidence of positive cord reaction. (6) When the cord is negative, it remains so in the baby at ten days in the great majority of cases. (7) We believe that a positive cord Wassermann indicates syphilis of the mother or baby or both. (8) We believe that the cord Wassermann should be practiced in all babies whose mothers are syphilitic or are suspected of being syphilitic. (9) We believe that a baby with a positive cord Wassermann should be treated as syphilitic until proved not syphilitic over a period of months or years. (10) Answer to the question ''When is a newborn infant syphilitic,'' is not yet at hand.

DR. FENTON B. TURCK read a paper entitled **The Pathological Reaction of Tissue Extract (Cytost) Liberated in Pregnancy. (Toxemia of Pregnancy and Shock.)** (See page 139.)

DISCUSSION

DR. F. H. PIKE.—I am studying this subject from the point of view of biology, and will discuss it from that point of view. During the war and at its close we were very much excited because of the findings of Dale and his collaborators that the products of injuries and wounds result in clinical shock. Dale isolated chemically one substance which he thought was histamine and which he thought was responsible for the rather sudden and unhappy ending of cases of severe wounds on the battle field. All this time we had growing up here in America work leading to exactly the same conclusions. Because of this peculiar blindness we did not see it. Now I am engaged in translating Dr. Turck's results into my own language so that I can understand them.

When we say that a patient dies of shock, unless we specify the conditions under which the patient died the mere term shock does not mean much. I do not know why the patient died or what caused the shock of which he died. Now I want to bring out just one thing. If this rapid destruction and rapid disintegration of tissue after severe wounds leads to sudden collapse and death, I want to ask you what the effect would be of more gradual doses for weeks, months or perhaps years. The effect is a question of dosage. In pregnancy we have a rapid change in the tissues, we have a rapid formation of tissues and the metabolism in certain regions is greatly increased in rate; and under these conditions there is nothing more natural than that the mechanism of metabolism should occasionally get out of control. Why is malignancy associated with so much more cachexia than the surgical removal of the same amount of tissue, or than is associated with a benign tumor of the same size? I do not care what this means in terms of histology, or that one

form of tumor gives rise to metastases and the other does not. But in terms of biology one is a question of altered metabolism, of more rapid breakdown of tissues, and the other is not. In one malignant tumor, associated with obstetrical and gynecological practice, syncytioma malignum, we have a very rapidly fatal growth, and I think we will find in other cases of malignant tumor that we have a more gradual tissue destruction, lasting for long periods of time, liberating toxins or other substances which may lead to cachexia. Some years ago I became interested in the terms toxin, poison, venom, etc., and looked them up in the dictionary. If you study these terms you will find that the word toxin goes back to decaying flesh, and implies something that has a bad odor. The meaning is something the same as was understood by the old Greeks when we speak of the products of the breaking down of tissues as toxins.

Department of Reviews and Abstracts

Collective Review

Midwifery in India*

BY KEDARNATH DAS, M.D., CALCUTTA, INDIA

(Continued from January issue.)

MIDWIFERY IN INDIA UNDER BRITISH RULE

YOU are aware that the gradual establishment of British rule in India was the work of Anglo-Indian surgeons who were instrumental in securing trading concessions and charters for the East India Company, leading up to the establishment of the three great centres at Bombay, Calcutta and Madras. But it was not until well after Clive's victory at Plassey in 1757, that we see the Indian Medical service taking part in the gradual introduction of British Medicine into India. The first attempt to impart medical education in Bengal on Western lines, was made in 1822. Instruction was given through the medium of vernacular languages along with Hindu and Arabic systems. Dissection was not attempted, neither any sort of clinical teaching (in midwifery).

A thorough and efficient system of medical education, imparted through the medium of the English language and based on rational and scientific lines, was introduced in India by Lord William Bentinck in 1835 with the establishment of the *Medical College of Bengal* at Calcutta. Similar colleges were established in Madras and Bombay very soon after. Some years later, a medical college was started in Lahore, but there are no facilities for clinical teaching in midwifery, owing to social conditions of women of that part of the country. Three other medical colleges have within recent years, been started, one at Lucknow, with practically no arrangement for the training of students in practical midwifery, one at Delhi for women students only, and the third at Calcutta, the second medical college in that city, affiliated to the Calcutta University.

Lying-in hospitals were opened in connection with the medical colleges at Calcutta, Madras and Bombay for imparting clinical instruction in midwifery as early as 1840. The Eden Hospital at Calcutta contains 96 beds for obstetric and gynecologic cases, deals with about 1200 labor cases annually and affords clinical instruction to about 120 undergraduates of the first medical college. In the second medical college at Calcutta, which is known as the Carmichael Medical College,

and which has been started in 1916, provision has been made for obstetric and gynecologic wards containing 60 beds.

These wards are intended to provide clinical material for teaching 50 students every year. Bai Matlibai Obstetric Hospital at Bombay gets more than 1200 labor cases every year and the students of the Grant Medical College are trained there. In Madras there is a large maternity hospital with a school of obstetrics attached to it. The average number of confinement cases is more than 2500 per annum. It affords not only undergraduate but also postgraduate training. It should be mentioned that so far, no extern maternity or district system has been organized in connection with our medical colleges and students are trained under strict hospital conditions.

It is pertinent to observe here that although the practice of midwifery on Western lines was introduced into India only 80 years ago, much has been accomplished within this period. The chief difficulty lies in overcoming the deep-rooted social prejudices of centuries. In a large provincial town in India you can observe, side by side, midwifery work of the best modern type and of the worst primitive type. The problem is one of social evolution which is being brought about steadily and I may say, fairly rapidly. In Calcutta, operative midwifery among Indian women, has been mainly in the hands of Indian (men) doctors since 1842; but ordinary confinements are attended by tne usual "handy women." A certain number of Indian midwives are being trained in the maternity hospitals but their number is yet too small to create a tangible impression on midwifery practice in Bengal. The total average output is 15-20 a year. I may also mention that the supply of fully qualified practitioners has not been adequate. In the whole of Bengal there are 3709 registered medical practitioners of whom only about a third are medical graduates. Obstetrics and gynecology are still in the hands of a few men. In Calcutta, with a population of one and a quarter million we have not more than a dozen of such men.

Medical Missions exerted great influence in introducing Western obstetric methods in India. The first regular medical missions in Southern India seem to have been founded and supported by citizens of the United States between 1830-1840. Since then the work has progressed and increased.

Medical Women.—In a country like India, where a large proportion of women observe the purdah, medical women were an important factor in popularizing Western methods among Indian women. Lady doctors first made their appearance in connection with medical missions. The first appears to have been Miss C. Swain, M.D., who joined the American Methodist Episcopal Mission in Northern India in 1869. The employment of medical women in India, however, received a great impetus from the Foundation of the Dufferin Fund in 1885. Dufferin Hospitals have been established in practically all important towns in India, for affording female medical aid to the women of India. To my mind, this scheme has a restraining influence on the social evolution, to which I have already referred.

Within recent years great attention has been paid to the *study of tropical diseases* and the importance of the influence of tropical conditions on physiological functions and obstetric problems has been realized. The most obvious effects of a hot tropical climate during pregnancy are

(1) lassitude and depression of spirits, due to the lowered nervous tension consequent on the strain placed on the thermotaxic mechanism by the unusual thermal environment; (2) phosphaturia, due to perverted metabolism; (3) pyrexia after labor possibly due to a failure of the thermotaxic mechanism and (4) faulty involution of the uterus due to atonicity. Moreover, the observations on diet and metabolism in Bengalese, undertaken by Dr. McCay and others, go to show that the excretion of urea in Bengalese is very much less than in Europeans. It is clear, therefore, that conclusions drawn from certain physiologic standards, deduced from observations made in other countries, are bound to vary, e. g., ammonia coefficient. I may now indicate to you some of the subjects that have been investigated: (1) The age of onset of menstruation in Bengali girls, the average being 12. (2) Pelvimetry. The external measurements of the pelvis of a Bengali woman as compared with those of an American woman, are as follows:

	Interspinous	Intercristal	Intertro-chanteric	Externa Conjugata
Bengali	21	24.8	27	17.5
American	26	29	32	21

(3) Weight of Bengali children is on an average 10 per cent less than that of an English child. (4) The weight of placenta is proportionately less. (5) The frequency of twin pregnancy has been found to be in Bengalis 1:53 as against 1:96 in Europeans. (6) Frequency of puerperal eclampsia. It has been found that among Bengali women eclampsia occurs 1:66 while the English proportion is 1:50. (7) Influence of atmospheric conditions, viz: temperature and humidity, on the incidence of eclampsia. It has been shown that there is a direct relationship between the combined influence of temperature and humidity in the different months of the year and the number of cases in those months. (8) The etiology and pathology of Sutika (or puerperal diarrhea). This has already been referred to. There are numerous other problems which await solutions: viz., (a) the cause of greater frequency of osteomalacia in India, especially in certain communities (Marwaries and Bombay banias); (b) the prevalence of anemia during pregnancy, primary and secondary and its causative relation with malaria, and numerous other problems. I think I have sufficiently indicated the importance of tropical midwifery which evidently requires modification in our ideas regarding diagnosis, prognosis and treatment. All our obstetric instruments require modifying. I show you a modified pair of obstetric forceps for Bengali women.

Medical Registration, Reciprocity and Teaching of Practical Midwifery.—I shall finally allude to one other point and would invite a discussion thereon. The medical degrees of the Indian Universities have so far been deemed sufficient for purposes of reciprocal registration in the United Kingdom. Last year the question has been raised by the General Council of Medical Education and Registration of the United Kingdom that the teaching of *practical midwifery* in the Calcutta and other Indian Universities, does not come up to the standard laid down by them. They require that each student shall personally conduct twenty cases of labor. It is not necessary that students should attend maternity wards. The Council insists on the number *twenty.* Our

students at Calcutta conduct six labor cases in the hospital under proper hospital conditions and attend at least fourteen more under similar conditions, and not under the makeshift conditions of the district system, which is mainly in vogue in Great Britain and Ireland. Students of Indian Universities conduct their cases under the supervision of the professor or the senior hospital staff and are not left to pick up for themselves whatever they can, as in the district system. Our students are constantly in touch with the senior teachers and have the advantage of their supervision and guidance, while under the district system they are completely out of touch with them. Our students are compelled to attend the obstetric ward for a month, during which period they are made to reside in the hospital and see a large number of abnormal cases, while under the district system, the student learns extremely little of abnormal labor. In a considerable proportion of cases the child is born before or immediately after the student's arrival. To conduct under direct supervision of the senior staff or see one case conducted properly is, in my opinion, worth more than attendance on a hundred cases. The compulsory conduct of a specified number of confinements should, therefore, be abolished. I shall, therefore, enunciate the propositions (1) that a thorough practical instruction in midwifery can be imparted with a comparatively small number of labor cases properly utilized by efficient senior teachers; (2) that the mere attendance on twenty cases of labor without any supervision does not connote efficiency in practical midwifery; and (3) that mechanical devices, manikins, models, specimens, diagrams, stereograms, cinema films and other aids to obstetric teaching go a long way towards increasing the efficiency of practical knowledge in midwifery.

Selected Abstracts

Abdominal Cesarean Section

Blacker: **The Limitations of Cesarean Section.** Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 447.

Cesarean sections performed for such conditions as impacted shoulders, hydramnios, hydrocephalus, varicose veins and eclampsia prompt the author to this analysis of operative indications. The erroneous conclusion that the operation carries no serious maternal risk is often obtained from the study of small series. Under the best conditions abdominal cesarean section has a 2% maternal mortality which is augmented to 10% when the operation is done late in labor and 27% when done after attempts at delivery from below have failed. It has yet to be shown that the so-called extraperitoneal section or the lower segment operation diminish the risk in potentially infected cases. Cesarean hysterectomy, the safest procedure in this type of delivery, is highly undesirable in young women.

High forceps are to be avoided as a means of overcoming disproportion. Pubiotomy should be used more freely for outlet contractions. When an operator has failed to deliver by forceps, craniotomy on the living child is preferable to the attendant risk of cesarean section at this time. Craniotomy on the living child is avoided not by cesarean section late in labor but by the induction of

labor before term. In support of this the author mentions 307 women with contracted pelvis delivered without a maternal death by the induction of premature labor.

Twelve hundred and twenty-nine cases of placenta previa treated by conservative methods in four different clinics yielded an average maternal mortality of 2%. Three hundred and thirty-one cases of placenta previa treated by cesarean section (Hitschman, Kerr and Holland) carried an average maternal mortality of 7.05%. Cesarean section in placenta previa, therefore, increases the maternal risk for the sake of a child, premature in 33% of cases. In the case of a primagravida at term with a central placenta previa or even a multipara with a living child near term, cesarean section may occasionally be the preferable method of treatment.

Until the maternal mortality from cesarean section in eclampsia can be reduced to that obtained from the conservative treatment, the operation should be reserved for the exceptional case. In Holland's report 63 out of 196 cases of eclampsia treated by section died, a maternal death rate of 32%. The average maternal death rate from 1015 cases of eclampsia treated by conservative measures in three different clinics was 7.2%.

Cesarean section followed by hysterectomy, when necessary, is the logical treatment for fibroids obstructing the outlet. Eventration of the uterus and removal of the obstructing ovarian cyst, when performed in the second stage of labor will frequently make delivery by forceps from below easy and prevent a needless hysterotomy. To control hemorrhage and effect delivery with a minimum of shock, cesarean section is frequently the preferable method of treatment in severe cases of accidental hemorrhage. Unless accompanied by a contracted pelvis, or in the presence of disproportion, the treatment of faulty presentations by abdominal section is not justifiable. In our zeal to save fetal life we should not forget the added maternal risk which is associated with, and inseparable from abdominal cesarean section.   H. W. SHUTTER.

Paton, John: Cesarean Section in a Case of Prolapsed Cord.   British Medical Journal, Dec. 10, 1921, p. 987.

The author reports the case of a woman, aged 29, primipara, undilated os, labor commenced, large child, breech presentation. Several coils of a pulsating cord were presenting. The child was delivered by cesarean section. Both mother and child survived the operation.   F. L. ADAIR.

Holland, Eardley: Methods of Performing Cesarean Section. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 349.

Statistics on the cesarean sections performed in the United Kingdom from 1911 to 1920 show improvement in certain groups only over the results compiled by Routh in 1911. The maternal mortality remained about as before in cases operated after long labor or after attempts at delivery with forceps had failed, 10% and 26%, respectively.

Long experience with the classical operation has exposed its limitations and defects. It carries a tremendous risk where infection is present or suspected. There is a high percentage (4%) of scar rupture in subsequent pregnancies. Postoperative adhesions are the rule and intestinal complications are not infrequent. The presence of an incision in the active muscular portion of the uterus, which is at this time high in the abdominal cavity, is a distinct disadvantage to the old type of operation. Neglect in waiting until retraction has taken place before suture of the uterine wound, frequent failure to include sufficient uterine

muscle in the sutures and the ease with which the involuting uterus decomposes catgut are all factors unfavorable to the classical operation.

With few exceptions the author employs the transperitoneal operation through the lower segment of the uterus. The location of the wound low in the uterus, the absence of intestines in the field and the fewer blood vessels in this area are all advantages to the operation. Postoperative adhesions are infrequent. The thin uterine wall makes closure of the wound easy. When the wound is closed it is covered by bladder, peritoneum and in part fascia. So far only one scar rupture in subsequent pregnancy has been reported. The operation is largely favored for cases long in labor or where infection is to be feared. Difficulties may be encountered in cases with kyphosis, a short abdominal cavity, uterine fibroids, where operation is done before dilatation and retraction have occurred, in deep engagement of the head or where the presenting part is jammed firmly against the pelvic brim. H. W. SHUTTER.

Cameron, S. J: Cesarean Section. The British Medical Journal, June 10, 1922, p. 911.

The author states that the general indication for the operation has been extended within recent years and recognizes as present day indications the following conditions: (1) contracted pelvis; (2) neoplasm; (3) cicatricial contraction of the cervix and vagina; (4) accidental hemorrhage and placenta previa. The author is doubtful about (5) eclampsia as an indication, (6) ventro-fixation and vaginal fixation of the uterus, and in rare cases, (7) retraction ring. The proper time of operation is given as the first stage of labor before the membranes are ruptured or before the onset of labor. Site of incision: The author prefers an incision through the rectus sheath or a transverse incision. He thinks the incision should be made through the right rectus. In the treatment of the uterus, he walls off the peritoneal cavity with gauze sponges, delivers the child by the feet, and delivers the uterus after the child has been extracted. He sutures the uterine wall with the use of three interrupted silk sutures and then the remainder of the wall is closed with similar catgut sutures, and finally continuous suture of catgut is used throughout the entire length of the wound. F. L. ADAIR.

Kerr, Munro: The Lower Uterine Segment in Conservative Cesarean Section. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 475.

The utility of cesarean section as an obstetric procedure depends on our ability to perform a nonsterilizing operation which will be followed by a sound uterine cicatrix. The author considers in detail the relative merits of the classical and lower uterine segment operations. That our ordinary methods of suture of the uterine wound are unsatisfactory is shown by a 4% incidence of rupture in the cases subsequently becoming pregnant.

The chief reasons for defects in uterine scars are: incomplete asepsis, the irregular distribution of the uterine muscle fibres, uterine unrest subsequent to labor and the degenerative processes active in the puerperal uterus. Other unfavorable factors are the presence of the placenta on the anterior uterine wall in 40% of cases and the fact that sutures in the uterine wound must provide both hemostasis and coaptation. In a measure the above difficulties can be counteracted by the maintenance of rigid asepsis, suture of the uterine wound immediately on delivery of the fetus, the use of layered sutures in the wound and the avoidance of pituitrin and ergot.

The low transperitoneal operation with layered sutures overcomes many of the

objections to the older operations. There is less tendency to rupture in subsequent pregnancy. The incision is in a noncontractile portion of the uterus and if rupture does occur it is not until the lower segment has been thinned by labor. Objections to the operation are the vascularity of the area in placenta previa and the difficulties encountered where labor has not drawn up the lower segment. The operation may be difficult in the presence of deformities or tumors. Undoubtedly the operative technic is more difficult than the ordinary operation and will occasionally not be suitable for the emergency.   H. W. SHUTTER.

Copeland: Transperitoneal Cesarean Section. Journal American Medical Association, 1921, lxxvii, 449.

Copeland lays a great deal of stress on the importance of precision and team work in all operative procedures and, especially, in cesarean section. Before each operation he explains to each assistant and nurse the exact part he is to perform. In this way each performs his duty with precision and without waste of time. He further saves time by dispensing with drapes and by using large needles to avoid needle holders.

He makes a 5-inch incision beginning an inch to the right and above the umbilicus. The uterus is closed with a continuous suture including all but the mucosa. This line is covered with a Cushing suture. The abdomen is then closed in layers. In closing the article, he tersely states that progress must ever consist in simplifying the complex.   R. E. WOBUS.

Martius, Heinrich: Abdominal Cesarean Section. Zeitschrift für Geburtshülfe und Gynäkologie, 1920, lxxxiii, p. 160.

The author presents conclusions based on a series of 137 abdominal cesarean sections performed from 1912-1919 in Franqué's clinic in Bonn, of which 40 were extraperitoneal, 24 of the lower segment, 31 classical and 41 Porro cesareans. He states that the greatest advance of the last decades in the technic of cesarean section is the change in location of the incision from the contracting fundus to the passive lower uterine segment. The extraperitoneal section has been a necessary stage in the development of this change but may now be discarded. Walthard has shown that the peritoneum is able to take care of the spill of infected amniotic fluid. Of a series of 15 lower segment operations in which infection of the liquor was bacteriologically demonstrated, not one developed peritonitis, while all but three showed infection in the less resistant tissues of the wound or the periuterine structures. For this reason the true extraperitoneal operation, with its far more difficult technic, its danger of bladder injuries with serious consequences, and its extensive dissection in the less resistant connective tissue is less advantageous than the intraperitoneal operation so performed that an intact peritoneum covers the uterine wound. The greatly decreased danger of infection allows the application of the lower segment operation after a test of labor even when the case must be classed in the suspected group where the old classical operation would be absolutely contraindicated. Decreased danger of infection also allows the application of the operation to placenta previa with better fetal and maternal results than by any other type of treatment so far proposed. The very severely infected cases must still, as previously, be treated by the Porro operation and it is a matter of experience and judgment to determine when this is necessary. The lower segment operation will probably replace almost entirely the bone splitting operations with their complicated puerperia and poor end results. Perforation of the living child may still occasionally be necessary as in very badly infected cases with a child in poor condition where

a Porro operation would be required and the viability of the child is very doubtful, its life being sacrificed in the hope of future living children. Sterilization is justified on wish of the patient following the second cesarean and is best carried out by removal of the uterus. Wedge incision of the cornua counteracts the advantages of the lower segment operation. Menopausal symptoms, where the uterus is removed but the ovaries retained, are absent or not severe. Adhesions following the lower segment operation are much less common than after the classical cesarean and are usually parietal and without symptoms. Danger of rupture of the scar is also far less. In many hundred lower segment operations, only one rupture in succeeding pregnancy has been reported and in this case the rupture occurred in the fundal part of the scar which extended higher than usual. Better healing probably occurs because the lower segment remains inactive while the fundal wound cannot be completely immobilized due to recurring contractions of the afterpains.

MARGARET SCHULZE.

Berkley: Cesarean Radical Hysterectomy Following the Application of Radium.
Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 538.

Berkley reports the following interesting case of cesarean section for carcinoma of the cervix. A thirty-four year old primigravida between six and seven months pregnant was found to have an indurated ulcer on the posterior lip of the cervix. Excision proved the lesion to be a squamous cell carcinoma. At the request of the patient pregnancy was allowed to continue and radium (232 mg. for 8 hours) was inserted into the ulcer on two occasions. Cesarean section followed by radical hysterectomy was done near term. The baby at birth had two bald patches on its head corresponding to the position the radium had occupied. The bald spots disappeared and the mother and baby were alive seven years and five months after operation.

H. W. SHUTTER.

Villarama: Normal Deliveries Following Cesarean Section. Journal of the Philippine Islands Medical Association, 1921, i, 11.

He reports three cases in which normal deliveries occurred after cesarean section. All three cases were septic during the puerperium but there was no evidence that the uterine incision was infected. The author concludes that "so long as the uterine scar is not defective (which condition is brought about by infection of the uterine incision) in the absence of contracted pelvis, normal delivery can be predicted after cesarean section. In the presence of contracted pelvis, however, labor may be induced in the eighth month of gestation."

W. K. FOSTER.

Couvelaire: Obstetrical Future of Women after Abdominal Cesarean Section.
Gynécologie et Obstétrique, 1920, 225.

This study is based on fifty gestations in forty-one women who had previously undergone an abdominal cesarean section.

The advances in the technic of the operation have rendered the dangers of weak scar and of adhesions to neighboring organs practically negligible. The operation does not increase the chances for abortion and premature labor. Rupture of the uterus is rare. Of 41 uteri that had undergone one or two cesareans, in only two was a subsequent rupture seen. Though rupture may occur in the last three months of pregnancy, it is most frequent after the onset of labor. It takes place usually without premonitory signs. All women who have had a cesarean should, in the last months of subsequent pregnancies, be where immediate operative measures may be carried out if necessary. Selective cesareans

should be performed at the advent of labor. If no pelvic obstruction exists, the woman should be given a trial of labor under careful supervision.

Conservative cesarean sections, practiced under proper conditions, militate very slightly against the obstetrical future of women. Though the risk of rupture in subsequent pregnancies does exist, it is small and improved technic is rendering it smaller.   R. T. LAVAKE.

Holland, Eardley: Rupture of the Cesarean Section Scar in Subsequent Pregnancy or Labor. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 488.

Of 97 cases reported in detail sufficient for study two-thirds have appeared in the last ten years. Of 85 cases noted, rupture followed longitudinal fundal incision in 55, transverse incision in 28 and incision of the lower uterine segment once. As yet final judgment is reserved on the security of the lower uterine scars.

From the etiologic standpoint such accidental factors as twins, hydramnios, version, the use of hydrostatic bags and pituitrin were recorded only 17 times. Rupture of a thin scar may occur from the intrauterine pressure of normal labor. In 78 out of 87 cases of rupture the accident occurred at or within one month of term. In several cases the rupture had apparently occurred early in pregnancy or a gap in the scar of a previous section had remained open, the aperture being closed by adhesions only. In 34 out of 51 cases in which location of placenta was stated the placenta was attached under the site of rupture. Anatomical studies both from reoperation and postmortem show that frequently the contractile muscle of the upper uterine segment pulls away from the incision leaving only a bridge of peritoneum and endometrium to heal. Microscopic study reveals no analogy between the erosion and rupture of a tube in ectopic pregnancy and the rupture of a uterine scar. Sepsis seems to be the most common cause of imperfectly healed scars. Reoperation shows that the absence of temperature does not exclude sepsis in a wound. Silkworm gut is the ideal suture material for potentially infected cases. Retraction should be complete before suture of the uterine wound. Transverse fundal incisions are mechanically bad.

It is often forgotten that when women delivered previously by cesarean section are allowed to labor in subsequent pregnancy they may have virtually a primiparous labor. Although shock, pain, collapse, signs of hemorrhage, cessation of labor pains and distinct palpation of fetal parts are the classical signs of rupture, often the gradual occurrence of the accident alters the picture markedly. Due to hemorrhage the presence of the placenta under the site of rupture makes the accident more serious.

In 67 out of 89 cases, rupture involved practically the entire scar. Of 76 cases where treatment was possible 56 received hysterectomy, 26 wound suture, 2 vaginal hysterectomy and 2 drainage. Sixty-six out of 94 mothers recovered. Twenty-one out of 90 babies mentioned lived. Out of 1103 cesarean sections done previous to 1918, 487 have subsequently become pregnant. Of these 47 ended in abortion (spontaneous or induced), 78 delivered normally and 352 were delivered by cesarean section. Rupture of the uterine scar occurred in 4% of the 448 women who carried to term. Rupture in subsequent pregnancy occurred 15 times in 301 cases of cesarean section where catgut was used in the uterine wound, twice in 93 cases where the suture material was silk and in no cases where silkworm-gut was used. For theoretical reasons silkworm-gut is the most suitable uterine suture material.   H. W. SHUTTER.

Gamble, Thomas O: A Clinical and Anatomical Study of Fifty-one Cases of Repeated Cesarean Section with Especial Reference to the Healing of the Cicatrix and to the Occurrence of Rupture Through It. Bulletin of Johns Hopkins Hospital, 1922, xxxiii, 93.

In a discussion based upon the study of 63 pregnancies occurring in 51 women who had previously been subjected to cesarean section, the author draws the following conclusions: (1) The weak cesarean scar may be due to a single factor or to a combination of factors, the most important of which is infection. (2) An afebrile puerperium does not give an absolute assurance of perfect wound healing. (3) The perfection of technic in suturing the uterine incision will undoubtedly lessen the incidence of weak scars. (In this clinic the incision is closed with two layers of catgut the first consisting of deep buried interrupted sutures placed at intervals of about 1 cm., while a superficial running suture brings together the serosal edges. The decidua should be avoided, since any bits of it inverted into the wound may proliferate and develop into areas of friability). (4) Chromic catgut, in our hands, has proved to be a satisfactory suture material. (5) The uterine wound should not be closed, if possible, until firm contraction of the musculature has occurred. (6) As a rule, fetal elements do not invade the uterine scar. (7) Adhesions following cesarean section are common. They are not necessarily the result of coexisting infection, and may give rise to serious complications at subsequent operations. (8) The dictum "once a cesarean, always a cesarean" cannot be accepted without considerable reservation. (9) A patient who has once been subjected to a cesarean section should enter the hospital several weeks prior to the expected date of confinement, so that she may have the benefit of immediate operation should rupture occur.

C. O. MALAND.

Ichenhauser: Hernia in a Cesarean Section Scar. Deutsche Medizinische Wochenschrift, 1921, xlvii, 1060.

After having given birth to three dead children, a woman 27 years of age was delivered by cesarean section in 1913. A transverse incision was made in the fundus. There were no complications. Five years later she was admitted to the hospital on account of a troublesome cough. After this had subsided, a soft, dome-shaped swelling was noticed above the umbilicus. At operation, it was found that the uterus had ruptured at the site of the former scar and that the membranes were protruding from an opening 9 cm. in diameter. The living child was delivered through a median incision and hysterectomy performed.

R. E. WOBUS.

v. Jaschke, R. T.: The Justification of Abdominal Cesarean Section in the Treatment of Placenta Previa. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lviii, 249.

Cesarean section nowadays is for the large proportion of obstetricians, the method of choice in dealing with severe cases of placenta previa, especially placenta previa totalis. Hitschmann, who does not favor cesarean section as the usual method of dealing with placenta previa had a maternal mortality of 5% in his own cases of placenta previa treated by cesarean section. But he performed the classic operation. In the cases in which the low cervical cesarean is performed the mortality is not above 2% and it does not matter whether the operation is intra- or extraperitoneal. As Hitschmann himself mentions, the general maternal mortality for cesarean section performed for placenta previa is 3.6% whereas for the older methods (Braxton-Hicks version, metreurysis, etc.), it still is 7.6%.

Hitschmann's point of view as regards treatment is untenable because he fails to consider the life of the child. The lowest fetal mortality obtained with metreurysis is about 20% while the general fetal mortality where the older methods are used, is 30 to 40%. It is v. Jaschke's opinion that the child's life should be neglected only when a cesarean section would endanger the life of the mother.

About one third of the deaths from hemorrhage in placenta previa are due to lacerations incident upon the use of the older methods of delivery and since death from hemorrhage causes 4.8% of the total mortality of 7.6%, the number of deaths from lacerations is considerable.. In placenta previa totalis the frequency of lacerations is 2½ to 3 times as great and for these cases Hitschmann agrees abdominal delivery is justifiable. Finally the mortality from sepsis in placenta previa is twenty times as high as in cases with normally implanted placentas and sepsis is unavoidable in placenta previa where the old methods are used.

Half of the deaths from hemorrhage in placenta previa are due to the bleeding produced by the dilatation of the lower uterine segment during the third stage and immediately afterwards. Atony of the isthmus occurred in 12% of the author's cases. The wall of the isthmus may be thin and spongy and may tear easily when the old methods are used. The most certain prophylactic measure against atony of the placental site in the isthmus is cesarean section. If there is hemorrhage, the bleeding is under sight and can be controlled by tamponade or suture. The type of cesarean section which the author prefers is the intraperitoneal low cervical operation.   J. P. GREENHILL.

Hirst, J. C., and Van Dolsen, W. W.: Cesarean Section. Journal of the American Medical Association, 1922, lxxix, 2047.

The writers divide the indications into absolute and relative, the absolute being typically classic, the relative covering a wide field. They detail the technic of the various methods of doing a section, and offer the comment that sterilization is unnecessary, and that a patient may have numerous sections or labors following a cesarean without the expected danger of rupture of the scar, providing the suturing of the uterine muscle had been properly done. In a series of 252 cases they had a maternal mortality of 2 per cent and a fetal mortality of 7 per cent.
                W. KERWIN.

Polak, J. O.: The Present Status of Operative Obstetrics Referring to the Abuse of Cesarean Section. Surgery, Gynecology and Obstetrics, 1922, xxxiv, 566.

Since reliable statistics still show a maternal mortality varying from 2.9 to 14 per cent as a result of cesarean section, greater discrimination should be shown in choosing this method of delivery. That the indications for cesarean section are somewhat loosely applied in certain quarters is shown by the fact that the proportion of sections to the total number of deliveries varies widely. Thus, while in the Long Island College Hospital 8, and at Johns Hopkins 9 out of every 1000 parturient women are subjected to this operation, Potter performs it on 67.3 in every 1000.

Polak analyzes 2000 cases of cesarean section taken collectively from various American clinics and 200 cases from the Long Island College Hospital in order to show the various factors which influence maternal mortality. He believes that the morbidity following section is vastly greater than that following the ordinary clean abdominal operation. This he attributes to the fact that the postpartum uterus almost always contains pathogenic bacteria, at any rate after the ordinary delivery.

He believes that cesarean section will eventually save but few mothers' lives in eclampsia if this condition is treated by modern methods. Unfortunately, the fetal mortality after cesarean delivery is also quite high, 1 per cent of his series being stillborn, a further 4.5 per cent dying within the first 14 days of mundane life. This mortality is due, to a large extent, to prematurity and toxemia.

R. E. WOBUS.

Erratum

The abstract of Dr. R. T. von Jaschke's article which appeared on page 110 of the January issue is republished on page 221 of this issue because through error it was not published in full in January.

Book Reviews

Obstetrical Nursing. A Text-book on the Nursing Care of the Expectant Mother, the Woman in Labor, the Young Mother and Her Baby. By CAROLYN CONANT VAN BLARCOM, R.N. The Macmillan Company, New York, N. Y. Price $3.00.

This book is, in many respects, one of the most valuable and unique texts that has appeared recently. In the preface the author states that it is her desire to get away from the methods of a single institution and to write a book which will permit of wider application. In this she has been successful. The differences in the practices of the better clinics of this country and Canada have been described in a clear and concise manner—not to the point of confusion, but in such a way as to make the nurse more adaptable to the varying practices with which she will meet.

Miss Van Blarcom seems to have found the proper balance between the scientific aspects of the subject and the details of nursing care. The former are accurate and are derived from recent sources. Written in simple, easily comprehended language, the book gives the nurse an answer to many of the questions which perplex her and the understanding of which cannot help but make her work of more value. The clarity and thoroughness with which the nursing care of the mother and child is presented reflects the wide experience of the author as an obstetrical nurse and teacher of nurses. It is realized that at present it is not possible for all women to be delivered in hospitals, therefore, the various procedures of hospital routine are so simplified that they can be employed in the home.

Two chapters of the book, namely, those dealing with the nutrition of the mother and child and with organized obstetrical care, deserve particular comment for the reason that these two most important subjects are given scant attention in most of the texts for nurses and, indeed, in those for medical students as well. The former is written with the assistance of McCollum and Simmons and presents authoritative information on a subject that is receiving increasing attention. The latter gives the nurse a clear idea as to what is being accomplished by organized obstetrical work and the possibilities for service in this rather recent development.

The author deserves especial praise for the human atmosphere which pervades her book. She emphasizes the importance of the patient as an individual and points out the many services which the thoughtful, intelligent nurse can render her patient. The style of the book is simple and clear and the text is amplified by many well-chosen illustrations. Having recently completed a course of instruction for nurses in which this book was used as a text, the reviewer can testify personally to its usefulness. JOHN W. HARRIS, M.D.

Original Communications

THE PALLIATIVE AND OPERATIVE TREATMENT OF PROLAPSE OF THE UTERUS

By John Cooke Hirst, M.D.,

Gynecologist to Mount Sinai Hospital

and Charles Mazer, M.D.,

Assistant Gynecologist, Mt. Sinai Hospital, Philadelphia, Pa.

(From the Gynecological Service, II, Mount Sinai Hospital.)

THE uniformly successful operation for the cure of prolapse of the uterus is still one of the unsolved problems of gynecology. So many factors enter into the problem, that as yet no completely successful, uniform technic has been developed. The various types of prolapse to be considered are: 1. Prolapse in young girls. 2. Prolapse in the adult due to severe and constant muscular effort. 3. Prolapse in the elderly woman, due to general debility. 4. Prolapse due to mechanical pressure. 5. Prolapse due to the uncorrected consequences of childbirth.

Prolapse in young girls is really not prolapse at all. The cervix does protrude from the vulva, but the uterine body is not at a low level. The condition is simply one of supravaginal and infravaginal hypertrophy and elongation of the cervix, and simple high amputation of the cervix is all that is needed for a permanent cure.

Prolapse in the adult, due to constant muscular effort, is rather rare. It is due to either severe muscular strain or constant and long continued effort, as in a chronic asthmatic cough. Prolapse in the elderly woman, due to general debility and relaxation of all the pelvic sup-

ports is not at all uncommon. It rarely develops before fifty years of age, but is quite common after that age.

Prolapse due to mechanical pressure is due to some intraabdominal weight, such as the pseudomucin contents of a ruptured ovarian cyst. These collect in the lower abdomen and by the mere weight cause a complete prolapse and inversion of the vagina, as we have seen occur.

Prolapse due to the uncorrected consequences of childbirth form by far the largest class. Unrepaired injuries; injudicious use of forceps, especially the axistraction forceps; improper direction of pull on forceps; application of the instrument before complete dilatation of the cervix; too early resumption of the patient's household duties, especially if these include physical labor, are the chief conditions that predispose to prolapse. It will occasionally develop, however, when apparently all precautions have been taken, and no item of the patient's care has been neglected. Every physician has had such an experience sooner or later in his practice. We mention this to emphasize the fact that prolapse is not necessarily a consequence of neglect in the patient's care.

As the treatment of the last four varieties mentioned is the same, they can be considered together.

Symptoms.—These are too plain to require detailed comment. The patient's subjective complaint is that "the womb is falling down." This description she applies to all conditions causing a protrusion between the labia, whether rectocele, cystocele or actual prolapse. She knows that something is protruding; she knows of nothing that can protrude except the uterus and hence her description. As the bulk of the protruding mass is cystocele, bladder symptoms such as frequency, urgency, cloudy urine are her next complaint. There is no possibility of mistake in diagnosis. The protrusion can plainly be seen, and there is nothing it can be mistaken for. The degree of prolapse can better be estimated in the erect than in the recumbent position, though this method of testing the degree should rarely be necessary. It must be remembered, however, that rest in bed a few days will often cause the retraction into the vagina of a very extensive prolapse, and leave surprisingly little trace behind. It promptly recurs, however, as soon as the patient stands erect, and can be made to protrude by simply having her strain and bear down.

In cases of long standing, the vaginal mucosa and cervix are often badly ulcerated, from constant friction of the patient's thighs and clothing, and chemical irritation of the ammoniacal urine which frequently flows over the parts.

Degrees of prolapse are named from the position occupied by the cervix, when the patient stands erect. These degrees vary from pressure of the cervix on the perineal floor, presentation at the vulvar

orifice to the complete prolapse where the vagina is completely inverted and the whole uterine body is outside the vulvar orifice—the so-called procidentia uteri.

Palliative Treatment.—This is never curative. It is simply a crutch to be used when the patient is unable to be operated upon, because of some physical condition, which renders operative interference unsafe, or when the patient refuses operation.

For several years past, we have not considered diabetes a contraindication to operation. In any case of prolapse, the bulk of the discomfort is due to two factors, the protrusion of the cystocele and the accompanying backward displacement of the uterus. If these can be corrected, the patient will be surprisingly comfortable. In any case, therefore, where the cervix is not too badly diseased, in whom operation of any prolonged nature is inadvisable, we have done an interposition operation under local anesthesia. This can be done quickly, painlessly, and at one stroke corrects the cystocele and the retroversion. Nothing is done to the cervix or perineum. This is on the principle that half a loaf is better than no bread, and is vastly better than any form of pessary. We restrict this to patients in whom ordinarily operation would be refused, and the results have been very satisfactory. The only pain is when the uterus is pulled down to place the sutures, and is negligible. The anesthetic used is ½ of 1 per cent novocain solution, with 10 drops of $\frac{1}{1000}$ adrenalin to each ounce. It is used freely so as to infiltrate thoroughly all the space between the bladder and the uterus, and the peritoneum, when exposed, is infiltrated separately. The operation is then done by the technic described below.

Thus the palliative treatment is restricted to those patients who refuse to consider any form of operation, and yet demand some relief from their constant discomfort; or to those whose age precludes the possibility of operation. Before any form of pessary can be used, any ulcerated area must be healed. This is quite a lengthy process, consuming from two to four weeks, but is absolutely necessary as a preliminary step. Rest in bed, cooperation of the patient, normal salt solution douches twice daily and painting the ulcerated surface with 30 grains to the ounce nitrate of silver solution every forty-eight hours are all that is necessary. The nature of her condition should be fully explained to the patient, so that she will have patience for the time required for her relief.

At times the prolapsed mass is so large and edematous that it cannot easily be replaced in the vagina—the so-called irreducible prolapse. The patient is placed in the knee-chest posture, the mass surrounded by hot towels, changed frequently over a period of ten to fifteen minutes. Then by a process of taxis, like the reduction of a hernia, still in the knee-chest posture, the uterus is rather easily replaced.

Of the many varieties of pessary, only two are in any way satisfactory. These are not always dependable, and there will remain a certain number of cases, whose prolapse can be retained only by the very objectionable ball and stem, held in place by a complicated harness of abdominal belt and perineal straps. This apparatus is so cumbersome, and so unpleasant for the patient to adjust and wear, that it should be avoided whenever possible.

The majority of patients can be kept comfortable by either the Schatz or Menge pessary. Personally we prefer the Menge, as we have found it the more reliable. They are inserted and cared for in the same way, hence one description will suffice for both. After all ulcerated areas have healed, the patient is placed in the dorsal position, and the uterus replaced well in the vagina. The pessary is well lubricated and held in the right hand, by the shank. The patient's right perineal sulcus is pulled down with the forefinger of the physician's left hand. The pessary is inserted obliquely through the vulvar ring and then turned transversely across the vagina and pushed well up. The patient should walk around the office for a few minutes before leaving, as it is difficult to choose the proper size at one trial, and the pessary, unless of the proper size, has a disconcerting habit of suddenly dropping out.

After-care.—The patient is told to report in two weeks, unless discomfort brings her sooner. She takes a daily douche of sterile water. Antiseptic douches, especially bichloride of mercury, roughen the pessary, and saline solutions incrust it with salt. Sterile water is all that is necessary. She is warned as to the necessity of reporting every four to six weeks so that the pessary can be removed, cleaned and reinserted. The Schatz pessary is removed as one piece. The Menge is removed in two pieces, first detaching the dependent half. After cleaning, it is reassembled and inserted as one piece. The vaginal vault, vaginal walls and cervix are inspected, to detect erosion. If any appears, or if the patient develops an unpleasant discharge, the pessary must be left out for two weeks, and vaginal douches taken twice daily. This will be found necessary in the average case about every six months. The pessary is quite bulky, and acts of course as an irritating foreign body. With proper care, however, it can be worn for many years. It is never wise to use any kind of a pessary in a patient such as the average seen in hospital dispensary practice. These patients cannot or will not understand the need for routine visits for their after-care, and as long as they are comfortable, will never return for observation. Finally they report, often after years of neglect, and in a most deplorable state. We have more than once removed a salt-incrusted pessary from its ulcerated bed, in the only way possible; breaking it up with bone-cutting forceps.

Often patients will insist on the pessary being removed, to see if they cannot do without it. Of course no cure is obtained; without support the prolapse is as bad as ever, though in many cases the vulvar ring contracts so that a smaller size than the first must in time be used. It is not wise to allow the patient to go without the pessary; if she insists that she can, a short trial will convince even the most positive.

Operative Treatment.—This should always be recommended, unless contraindicated by age, disease, or the patient refuses consent.

The preparatory treatment, when necessary, is carried out exactly as in the palliative treatment. To operate upon a badly ulcerated vagina, with profuse discharge is simply to court failure.

The number of operations devised is ample proof that there is no unanimity of opinion as to any standardized technic. Any prolonged discussion of the methods devised is impossible, but one point only we wish to emphasize. It is a grave mistake to perform either abdominal or vaginal hysterectomy as a cure for prolapse, unless the uterus is so diseased as to make its removal imperative for that reason. Under those circumstances the removal is followed by as careful and extensive plastic work on the anterior and posterior vaginal walls, as if the uterus still remained. The uterus is the best possible support to retain the protruding cystocele, and no other structure, whether broad ligaments or vaginal fascia, will satisfactorily take its place. Again, a properly performed plastic operation in no way militates against subsequent childbirth, and to remove the uterus in a patient who may bear other children is not a justifiable procedure, unless it is hopelessly diseased. Recurrence need not be feared, if the patient is given proper care in her confinement. We cannot too strongly insist that no abdominal work is necessary for the care of prolapse of the uterus; hysterectomy is unnecessary and a grave mistake in judgment; no operative interference other than properly performed, extensive vaginal work is needed. Even when the patient is past the menopause, the uterus is not a useless organ and therefore to be sacrificed with impunity. It is the best possible support for the bladder, when properly utilized.

The operative technic as described below has given us very satisfactory, uniform results, over a number of years; we employ it routinely and have every reason to be satisfied with the results attained.

The steps of the operative procedure are as follows:

1. The patient is prepared as for a plastic operation, and arranged in the dorsal position. We routinely give them, one hour before operation, in addition to the usual dose of $\frac{1}{4}$ grain of morphin and $\frac{1}{150}$ grain of atropine, 2 drams of paregoric by mouth. This is to

quiet peristalsis, and prevent the bowels from moving on the table. It was suggested by Dr. L. F. Luburg, of Philadelphia, and has entirely eliminated this very disagreeable incident of plastic operations.

2. The vagina is thoroughly cleansed with cotton, tincture of green soap and sterile water, followed by 1 per cent lysol solution and finally 95 per cent alcohol.

3. The cervix is pulled strongly downward, by a double tenaculum.

4. By a circular amputation, the cervix is removed up to nearly the level of the internal os.

5. A dilatation of the cervical canal is done. No curettage is necessary. The dilatation is postponed until after the cervix is removed, because the cervix is so long that the blades of the dilator will not reach through the internal os. Unless the cervical canal is properly dilated, a secondary stenosis is very likely to occur. In the child bearing age, this will cause dysmenorrhea; in patients past the menopause, we have seen pyometra result.

6. The cervix is sutured like the ordinary Hegar amputation.

7. From this point, the four stitches remaking the external os are left long, and used as tenacula. They are much more convenient.

8. The first incision begins on the anterior vaginal wall just below the urethra and extends to the vaginal attachment of the cervix. A cross incision at right angles to this, at the vaginal attachment makes a figure like ⌐.

9. The edges of this incision are caught by four toothed Allis forceps and by traction made more prominent.

10. The vaginal wall is dissected loose from the bladder, taking care to include in the flap the layers of the vaginal fascia.

11. This dissection is carried far back into each anterior sulcus. so that the bladder is thoroughly freed laterally.

12. Now the fascia is split from the anterior vaginal wall. so that each flap consists of two layers: the inner fascia, the outer vaginal mucosa.

13. The uterovesical ligament is cut, thus completely freeing the bladder from its uterine attachment.

14. A flat bladder retractor is put under the bladder and pulled upward. This exposes the peritoneum.

15. The peritoneum is caught by forceps and incised.

16. The retractor is passed under the peritoneal flap. The anterior face of the uterus is caught with tenacula and the uterine body pulled out through the peritoneal opening. This is for the ordinary interposition operation, and for women past the child-bearing age only. If the patient is of the child-bearing age, and future children are

likely or desired, the uterus is simply held against the peritoneal opening and not pulled through it, and is left as an intraperitoneal organ.

17. The split fascia is caught far back, with a needle armed with No. 3 chromic catgut, and near the urethra; the needle is passed through the anterior wall of the uterus about one-half inch below the tubal insertions, and then through the fascia on the opposite side. This does away with the extreme anteversion of the uterus seen in the typical Watkins operation. When the stitches are tied the uterus is lifted high up behind the symphysis. By this, the bulging forward of the whole uterus and anterior wall, a not uncommon cause of failure of the Watkins operation, is entirely eliminated.

18. Three or four similar stitches are taken each a little lower than the preceding. None are tied as yet.

19. If the patient is of child-bearing age, the fascia is caught about one-third of the distance from the urethra to the cervix; the needle is then passed through the anterior wall at the point where the peritoneum is cut and then through the fascia of the opposite side. A second stitch is placed below the first. The uterus is then left as an intraperitoneal organ, the canal through which the bladder prolapsed is closed and future child-bearing is not interfered with.

20. All the stitches are then tied. Using the fascia alone permits a much better approximation, than when the entire vaginal wall is included, and is just as secure.

21. The excess of vaginal mucosa is then cut away and the edges neatly approximated with interrupted sutures of No. 3 chromic catgut. A continuous stitch is quicker, neater, but by too tight closure prevents drainage and a hematoma is practically sure to develop.

22. An extensive Hegar operation is done upon the posterior wall similar to the typical Hegar operation except that the tip of the rectocele is obliterated; the obliterated tip is anchored high up to the lateral fascia; the levator ani muscles are approximated by buried stitches of No. 3 chromic catgut and superficial ones of silkwormgut, the latter secured by perforated shot, to make their removal easier. The outside perineal sutures are also silkwormgut, as catgut has a bad habit of premature absorption, when under strain.

23. The vagina is douched with sterile water and packed with sterile gauze. The packing is removed in twenty-four hours.

Suture Material.—All catgut used is No. 3 chromic, durability forty days in fascia. No finer gut should be used. Silkwormgut is used to splint the catgut in the perineal repair. Experience has taught us this is necessary. Without it, premature absorption of catgut is all too common, and the advantage that catgut stitches do not have to be removed is more than offset by the greater risk of failure.

After-care is that of the usual plastic. All interposition operations require catheterization for some days. Great care to prevent cystitis is necessary. This distressing complication is made less likely if urotropin (gr. 7½) four times a day is given for the first week and one-half ounce of a 10 per cent solution of silvol is injected into the bladder after each catheterization. Merely because the patient has voided does not mean that the bladder is empty. A routine duty of every -visit should be palpation of the abdomen to detect the fundus of the bladder, should it be distended. Very commonly this will be found. A daily vaginal douche of sterile water is advisable. The proper care of the perineal sutures is essential. They should be irrigated four times a day with sterile water; any discharge around the knots is cleaned away with cotton pledgets on an applicator, using peroxide of hydrogen. Unremitting care is required, and this part of the routine will list the capabilities of the nurse. Poor nursing will ruin any operation. The care of the perineal external stitches is made easier if all the ends are confined in a single shot, and cut off smooth against the shot.

The silkwormgut stitches are removed about the eighteenth day. The patient gets out of bed on the fourteenth day. If we suspect unusual tension, we often let her go home with the internal stitches in place, having her come to the office four weeks after the operation to have them removed. On account of the difficulty of care, the external perineal stitches are always removed before she leaves the hospital.

Results.—In many hundred operations, done in the past twenty years, we know of only six failures. These were chiefly perineal failures. In one case only the cystocele recurred by the whole uterus and vaginal wall protruding from the vulva. Many of the patients were operated upon as a sequel to a previous unsuccessful operation. The most difficult of all to cure are the recurrences after ill-advised hysterectomy.

This technic in its present form is giving us satisfactory results. Failures are, of course, not impossible, but we know of no change at present by which the results secured could be improved. We are not wedded to any particular method, however, and should not hesitate to adopt any change capable of demonstration of superiority. As stated, we do not feel that the problem of the cure of prolapse is permanently solved, particularly as regards the cystocele.

1823 PINE STREET,
2238 SO. BROAD STREET.

CLINICAL ASPECTS OF BLOOD LOSS IN LABOR*

By Paul T. Harper, M.D., Albany, N. Y.

MENSTRUATION and parturition are the only physiologic func-
tions attended by blood loss. That occasioned by the former,
which is small in amount, serves a definite purpose, and is rarely
pathologic; while blood loss met in labor is more abundant, far from
purposeful, and, for the latter reason, is often pathologic. In the
latter instance bleeding is the inevitable consequence of placental
separation, and its pathologic aspects are illustrated by the dangers
of intrauterine asphyxia of the child when separation takes place pre-
maturely and, particularly, by the maternal mortality and morbidity
attendant upon its occurrence immediately following delivery.

Continuity of the uterine and placental circulations persists until
forces active during the third stage of labor separate the placenta and
expel it. With separation, patent sinuses distended with blood from
innumerable vessels present, and hemorrhage is inevitable unless
means are available to prevent it. The latter are at hand, and post-
partum hemostasis is as much a part of the work of the puerperal
uterus as is dilatation of the cervix or delivery of the child and, with
limitations offered by a fairly extensive bleeding area, it is reasonable
to presume that the work will be done no less perfectly.

Therefore undesirable blood loss attendant upon labor may be con-
sidered as a manifestation of abnormalities in or perversions of physio-
logic forces that check postpartum hemorrhage and keep it checked.
Not only to present it in such a light but also to make it possible to
minimize loss in every case and to cure it in others because manage-
ment is based upon knowledge of why the particular patient bleeds,
the following paragraphs are written.

The factors that bring about physiologic hemostasis immediately
following termination of the third stage are multiple ligation of the
smaller uterine vessels, heightened coagulability of the blood, and
slowing of the blood stream.

The inherent property of uterine muscle to contract firmly makes
it possible for the principle of compression to be applied to postpartum
control of bleeding; and the condition of the uterus immediately after
labor makes such compression highly efficient. When the uterus re-
tracts, thickness of its walls increases to the same extent that size
of its cavity diminishes; and, although the latter is important in that
the interior of the uterus presents less surface from which it can

bleed, it is the thickness of the uterine walls that makes it possible for bleeding to be checked. Hemostasis results not only because the innumerable uterine vessels are bent and twisted as they lie among the tightly packed muscle fibres of the retracted uterus but also because each vessel is "ligated" at several points along its course by the muscle fibres in relation with it. Further, compression is available at once; for the uterus may be expected to maintain the activity that has characterized it since labor began.

In the constricted vessels and particularly in the uterine sinuses, the blood undergoes rapid coagulation, made possible by its increased fibrin ferment content and the formation of multiple thrombi begins. Lowering of blood pressure that follows delivery still further facilitates hemostasis by increasing the tendency of the newly formed thrombi to remain in their places.

How much time is required to establish complete physiologic control of bleeding cannot be stated arbitrarily. Just as certain factors expedite and others retard progress in the second stage, so inherently weak or temporarily exhausted uterine muscle, or impaired coagulability, or even hypertension may interfere with the relatively early establishment of the state wherein further bleeding is not to be expected. However, experience leads to the conviction that at the end of eighteen hours chances of new blood loss are remote. This view is based upon observations that the fundus remains firm, the lochia that follow are less than normally abundant, and involution proceeds rapidly when an intrauterine tampon is removed eighteen hours after its introduction, immediately postpartum, for the control of bleeding due to atony of the uterus.

The foregoing paragraphs are descriptive of what may be termed the physiology of postpartum control of bleeding; and it is as perfect a "mechanism" as is that of any one of the conventional stages of labor. Further, careful analysis of cases almost invariably reveals adequate explanation not only of the bleeding itself but also of the cause. Finally, with causes understood, the mechanism can be kept normal or its untoward manifestations treated efficiently. More to emphasize its clinical importance than merely to add to the already extensive obstetric nomenclature, it is urged that the period beginning with termination of the third stage and ending twelve or eighteen hours later, with more or less complete hemostasis established, be considered labor's "Fourth Stage."

Because it is much more important that the latter have a place in the physician's mind than in the literature, it is urged as a concept rather than as a mere designation. With his interest in the clinical aspects of this important period increased, the physician's conduct of it can be counted upon to be so satisfactory that even physiologic

blood loss will be minimized, while serious hemorrhage after delivery will become one of the rarest of obstetric accidents.

Although "postpartum" indicates that the bleeding it qualifies comes on after delivery and for this reason might be applied to its occurrence at any time after termination of the third stage and before involution is complete, it is undue blood loss coming on during the third stage when the placenta is actually retained (that is, separated but not delivered), or after delivery of the placenta and within the first twenty-four hours following delivery, to which your attention is directed.

The condition is known as postpartum hemorrhage and the designation is satisfactory only as "hemorrhage" is defined. Although the latter is said to obtain when "physiologic blood loss is exceeded," there must be some standard by which "physiologic" loss is measured if a moderately profuse natural loss is to be differentiated from a hemorrhage of mild degree.

The practice of measuring physiologic loss in ounces has little to commend it. If the limit is low, for instance from four to six ounces, every large woman delivered of a nine or ten pound child and losing from eight to ten ounces of blood within a few minutes would suffer from "postpartum hemorrhage" when, as a matter of fact, the blood lost represents efficiency on the part of the uterus in establishing hemostasis at a large placental site; while, if it were placed a few ounces higher, a slender, undernourished and anemic patient losing six or eight ounces might be considered as having had no more than a "physiologic" loss when, in terms of her ability to stand it, she has had a "hemorrhage" of mild degree.

It is apparent that the amount of physiologic loss is measured not arbitrarily in ounces but in terms of size of the patient and, especially, in terms of her ability to suffer it. There are further standards to which "natural" loss conforms: it should never be abundant in that it flows even slowly from the vagina, nor should it appear in clots.

Reasons why blood does not flow from the physiologic uterus are apparent when experiences with the control of active bleeding from fairly extensive, lacerated wounds in highly vascular tissue are considered. In that the sinuses have been opened up and the placental site is fairly extensive, the interior of the postpartum uterus presents such an appearance. In the former instance, hemostasis that allows blood to flow after compression by appropriate dressing has been applied, may be considered inadequate. On the other hand, such a wound would be expected to ooze. In the latter instance, it is force of the contracting and retracting uterus that applies compression, and the physiologic hemostasis that results permits of oozing; when

blood flows, compression is not perfect and the loss occasioned may be said to be "unphysiologic."

Though coagulation takes place quickly, blood in motion does not coagulate. However, when the flow is retarded, the clotting process goes on rapidly, and the discharge of clots from the uterus is proof of earlier retention of blood therein—in other words, that the uterus has ballooned-up and the clots are its result. Ballooning-up is not characteristic of a physiologic uterus. Therefore, expulsion of clots may be said to be evidence of "unphysiologic" bleeding.

If minor perineal injuries are excepted, postpartum hemorrhage is the most frequent complication of parturition. Readiness with which this view will be accepted depends altogether upon the individual's reaction to what is known as physiologic blood loss. Here the latter is considered to have been exceeded and hemorrhage to obtain, when any unnecessary loss, regardless of amount is sustained.

Causes of postpartum hemorrhage are found in conditions that interfere with or make impossible firm contraction of the placental site. Although deficiencies in the fibrin ferment content of the maternal blood could delay the formation of thrombi and although it is conceivable that increased tension could even dislodge those already formed, and either or both occasion undue blood loss, it is probable that they are no more than predisposing causes and that their influence would be quite completely counteracted by efficiency in contraction and retraction of the uterine muscle. At least it is reasonable to presume they are unimportant factors; because, in the first place, blood lost in postpartum hemorrhage almost invariably clots soon after it is exposed to the air, giving evidence of satisfactory fibrin-ferment activity therein, and, in the second, hemorrhage is no more characteristic of the hypertension of toxemia than it is of labor where pressure is normal. Adequate explanation of postpartum bleeding must be sought elsewhere, and clinical experience bears out the contention that it is found in failure of forces that produce compression at the vascular placental site.

Of the types of hemorrhage that are met in "hourglass" uterus where the separated placenta is incarcerated in the upper segment by tonic contraction ring, that following separation of a placenta located toward or in the lower segment, and that due to muscular insufficiency of the upper uterus. the last alone will be considered. This because it is the type most frequently met, because its clinical picture is thought to be characteristic even though possible of misinterpretation, and, finally, because it is highly preventable as well as amenable to speedy cure.

In the conventional postpartum hemorrhage bleeding is external, or open; it is more or less continuous; and it comes from the upper uterus

that is felt to be soft and feebly contracting. More often, however, it is thought to be concealed.

Bearing in mind the tendency of free blood to coagulate, the presence postpartum of the physiologic retraction ring that makes exit from the upper segment relatively small, and that soon after delivery ample compresses are placed over the vulva and the patient's thighs are approximated, it will be apparent that several factors help to keep uterine bleeding concealed. Blood flowing freely from the poorly contracting placental site is held within the uterus by the coagulum at the lower segment and may remain concealed for a considerable time. Sooner or later, either because increasing distention stimulates the upper uterus to pronounced contractile efforts or because muscular insufficiency that occasioned bleeding in the first place is recovered from, a contraction of sufficient strength appears and both fluid and clotted blood is expelled in a single gush. These are the cases of hemorrhage that "come on" a few hours after delivery when little or no external bleeding has been apparent earlier, and that are claimed to be occasioned by "retained blood clots." That clots are expelled is proof that bleeding has been going on for some time. Further, in physiologic labor there are no blood clots to be "retained." They are produced by gradual accumulation of blood that, for reasons given above, remains concealed until, with a supreme contractile effort, the uterus expels it. In all of these cases it may be presumed that bleeding occurs because the placental site is as soft and poorly contracted as is the uterus about it.

Until blood lost amounts to enough to influence pulse and respiratory rates, there are few if any subjective complaints. However, objective signs are characteristic and are two in number. They are, first, external bleeding as hemorrhage is "open" and, second, increase in size of the uterus as it is "concealed." These rather than the "soft, boggy uterus" are to be looked for. A uterus presents the latter signs only when in a state of profound inertia and when bleeding is profuse.

That the attendant practice "persistent, gentle massage of the fundus" for the first hour postpartum is far less important than that she measure height of the empty uterus and watch closely for evidence of its ballooning. As a matter of fact, the latter is thought to be her chief concern. When several ounces of clotted blood are expressed from such a uterus at the end of the hour, the material is not "retained" blood clot but unphysiologic blood loss that has remained concealed (all the time giving due notice of its presence) until it is expelled by the force expended in artificial compression of the fundus. By the same token, the escape of a mass of fluid and clotted blood from a uterus a few hours after delivery does not necessarily mean a

suddenly developing hemorrhage. The latter has been going on since delivery and the material expelled is the result of gradual accumulation within the uterine cavity; while the patient is about as good a risk at the time as she was an hour or two earlier, for little more has happened than conversion of a concealed into an open postpartum hemorrhage.

External hemorrhage results when blood flows from the uterus or leaves it in clots; while hemorrhage is concealed when progressive increase in size of the postpartum uterus is met. The one indicates an unphysiologic blood loss as definitely as does the other.

Because so many cases of hemorrhage are accounted for on the basis of muscular insufficiency and because the latter condition is so highly preventable, the prophylactic treatment outweighs the active in clinical importance. It should be more satisfactory to the physician and it is far more beneficial to the patient to have prevented a moderately severe postpartum hemorrhage than to have treated it even with most pronounced success.

Prophylaxis means such perfect conservation of uterine muscle energy throughout labor that the postpartum period will be entered upon with the uterus in possession of enough contractile power to accomplish physiologic hemostasis. Prevention therefore begins hours before possible blood loss occurs; and as essentials of it there may be mentioned the following: saving the patient's general strength by keeping her in bed while active labor is in progress and especially by not permitting premature and ineffectual efforts at "bearing down," artificial rupture of membranes when dilatation is quite complete and advance is impossible because the bag of waters does not rupture spontaneously, placing a limit upon the time that frequent, propulsive, second stage contractions are allowed to continue with little or no promise of eventual spontaneous delivery and terminating labor at a time when efficient contractions can be supplemented by traction from below, and, finally, removal of the contents of distended bladder or rectum that of themselves may reflexly inhibit satisfactory uterine action at the time it is needed. The foregoing are urged in order that termination of the third stage will be reached and the uterus found active rather than completely or even partially exhausted.

In this connection it is urged that labor is not necessarily normal because it terminates spontaneously. For instance: when a primipara delivers herself spontaneously of a large child after an active second stage of possibly 4 or 5 hours, the postpartum period is usually entered upon with her store of uterine muscle energy depleted, and undue bleeding is to be expected. Here labor, although it terminated "naturally," was abnormal in that physiologic uterine action following it was impossible. The hemorrhage that followed occurred

because the patient was permitted to deliver herself spontaneously. Had work to be done and available muscular energy been adequately judged, operative delivery would have been brought about earlier and the degree of hemorrhage would have at least been greatly diminished.

Unquestionably, more satisfactory convalescence would be experienced in many cases were expulsive efforts supplemented by judicious efforts at traction as soon as it is evident that the uterus has done its best. Presence of a well-defined caput and of satisfactory molding show that the uterus has been efficient, while lack of progressive advance proves it unequal to the supreme efforts that result in delivery. Conservation calls for preservation of all possible muscular energy for the postpartum period; and little if any can be expected to be available if the uterus is allowed to continue its ineffectual expulsive efforts too long. The foregoing is not to be mistaken as an appeal for more general employment of operative delivery. It is meant to establish the conviction that operative delivery not infrequently is a conservative procedure in that it substitutes the slight dangers of proper forceps application for the graver ones that result from quite complete physical and nervous exhaustion incident to protracted labor.

Because muscular insufficiency can be expected to follow the operative termination of labor in the complete absence of uterine contractions, it is apparent that neither may be allowed to continue so long without interference that profound inertia develops nor may delivery be accomplished under the influence of anesthesia so deep that the uterus is as completely relaxed as are the skeletal muscles.

It is rare for marked inertia to develop suddenly. As a matter of fact, its onset is commonly gradual; and the deeper and more dangerous degrees can be prevented if decreasing efficiency of contractions in the presence of such adequate causes of inertia as disproportion, malpresentation, malposition, and flabby musculature are interpreted as evidences of beginning insufficiency and if the failing forces are at once supplemented by properly selected operative aids. A deep, late, second stage inertia, or one coming on postpartum, is proof that the particular uterus has worked too hard; if opportunity to observe the case has been afforded the physician, it is proof that operative assistance has been too long withheld.

Undue postpartum blood loss demands active treatment that is adequate; and as its essentials, there are urged the immediate and permanent control of bleeding in every case, and replacement of fluid mass lost and combat of shock in cases where seriousness of hemorrhage makes one or both necessary. Hemorrhage is to be stopped at the earliest moment possible; and the success or failure that attends one's effort in this direction determines how necessary

will be such procedures as infusion, transfusion and the like. For instance: if blood clots were expressed from a moderately ballooned-up uterus one hour after delivery and firm contraction and retraction of the particular uterus secured, the possibility of a much more severe "open" hemorrhage several hours later would be remote and the necessity for active general treatment that the loss might demand would not arise.

It is a matter of experience that in many cases of postpartum hemorrhage, bleeding is checked with difficulty even though all the conventional methods of control have been employed. If the procedures have been carried out properly (and such is almost invariably the case) and bleeding persists, it is logical to conclude that those employed were not suited to control of the particular hemorrhage.

Why bleeding in many cases may be expected to continue in spite of customary methods of control is apparent when the following facts are considered: first, the commonest causes of hemorrhage are muscular insufficiency (that is, varying degrees of inertia) and low placental implantation; and, second, the usual methods of control, namely. vigorous massage of the fundus, indirect stimulation by pituitary extract and by ergot and intrauterine stimulation by means of the closed fist or of hot, astringent douches, depend for their efficiency upon the ability of the uterus to respond with vigorous contractile efforts. It is unreasonable to expect the uterus to supply something it has already given evidence of lacking.

With the placental site in or encroaching upon the lower segment. more or less bleeding persists even though the upper segment contracts and retracts spontaneously or is made to do so by stimulation. Hemorrhage of this type can be counted upon to persist until formation of multiple thrombi in the more or less inactive lower segment occludes the bleeding vessels and sinuses. The process is relatively slow and. in these cases, tamponade of the entire uterus offers the only assurance of immediate and permanent control of bleeding.

To the extent to which the postpartum uterus is muscularly insufficient, it will fail to respond to stimulation of all kinds. Further, it must be remembered that stimulation of a tired uterus does no more than excite it to increased efforts that cannot be counted upon to be maintained and that, when the latter wear off, the degree of insufficiency is increased. Pituitary extract and ergot draw from, they never add to, the store of valuable muscular energy of which the uterus is possessed. They are valuable aids in the treatment of hemorrhage but they may not be depended upon as cures.

When efforts at stimulation have failed to excite the uterus to activity, it is apparent that the organ is unable to respond and that further administration of drugs or application of measures that de-

pend upon latent muscular efficiency to accomplish results may not be practiced. The means to be employed now is firm intrauterine tamponade and nothing less affords the patient complete protection against further blood loss to which she is entitled.

The sound principle that the puerperal uterus should not be invaded does not hold when postpartum bleeding persists, because necessary ends can often be accomplished in no other way than by invasion by a force that stops bleeding at its source.

Intrauterine tamponade can be counted upon to check any postpartum hemorrhage; and such preparations should be made that it can be carried out without delay as soon as the more conventional methods demonstrate their inadequacy. Not only is it the most efficient method of active treatment of hemorrhage; it is prophylactic as well in that it makes subsequent blood loss negligible. It expedites the convalescence from antepartum and intrapartum hemorrhage by making even "physiologic" postpartum loss impossible.

While the management of lost blood mass and shock is important, it is with prevention of these states that the obstetrician is primarily concerned. The time to infuse or to transfuse is before shock is fully developed, and shock may be expected when a difficult operative delivery, particularly one in which extensive trauma to the maternal soft parts has been done, is followed by hemorrhage even of moderate degree. Nothing may avail when shock is preliminary to collapse; while satisfactory results are not impossible in ordinarily grave cases when vigorous general treatment is instituted early enough.

There is nothing in medicine more interesting than the defense of the parturient against blood loss; and there is no problem that can be perused with greater profit than that of reduction to the minimum of hemorrhage incident to labor.

289 STATE STREET.

UTERINE DISPLACEMENTS AND PREGNANCY*

By Benjamin Rush McClellan, M.D., F.A.C.S., Xenia, Ohio

SIX years ago, Dr. John Osborn Polak published a paper entitled "A Detailed Study of the Pathological Causes of Sterility with the End-Results." His words of introduction are so graphic and stirring that they are worth many times repeating in this presence: "Probably no subject is of such sociological significance to the gynecologist as that of sterility. Homes are wrecked, lives are sacrificed, and fortunes are lost, all because of the inability of a woman to conceive or to successfully bring forth the fruits of her conception." Our subject touches only a small portion of this great field. Nevertheless, it is sufficiently important to claim attention. Some one has said that it is much overwritten but still unsettled. So long as gynecologists differ radically in their opinions, is it not our duty to keep at the threshing until the wheat is separated from the chaff?

First, then, let us consider the importance of the subject. Child tells us that "retrodisplacements of the uterus are among the most common pathological affections of the female generative organs, and have much to do with sterility and lessened fertility, but it is next to impossible to give even approximately accurate statistics regarding their frequency and effect on procreation." Winter, who made a very careful study of 178 cases of sterility, estimates that malpositions of the uterus account for about 8 per cent of sterility in the human family. Seitz says that out of two hundred cases examined for sterility or habitual abortion 26 were operated for retroflexion. Polak says that out of 244 cases of sterile women without inflammatory complications there were 20 who were treated for retroflexion.

On the other hand, there are gynecologists who say that displacements of the uterus are of negligible importance as a causative factor in sterility. One of these is quoted as having facetiously said that "a woman's round ligaments would have to be shortened as often as a man would need to have his hair cut if she would keep the uterus in so-called normal position." Another writer on the subject tells us that "the uterus functions perfectly in any position so long as there are no inflammatory complications." Is it not likewise true that the chances of a fruitful pregnancy are much in favor of the normally placed uterus?

Not a few gynecologists decry all operative intervention in eliminating the causes of sterility and tell us that "endocrines will

clarify the question of uterine displacements and sterility and thus avoid operative measures which leave many distressing sequelae.'' Another says that he ''has discarded all the classical suspensory operative methods of fixation of the uterus on account of too large a proportion of failures, especially in respect to subsequent pregnancies.''

This diversity of opinion makes it well worth while to spend some time in discussing a subject that spells weal or woe to many of our clients. The writer lives in a strictly rural community in which the pioneer residents were largely Scotch-Irish. As a rule, the first families of these sturdy settlers were very large, an average of ten-plus. The second generation had an average family of less than five; the third, of one-plus; the fourth average is less than one-half of one. Indeed, many of these pioneer families have no male descendant, and face extinction in a few years. The desire for the perpetuation of family name and type is ever strong, and many times it is very important. More than once has it occurred that the timely correction of a misplaced uterus has been the means of saving to the community a type of citizenship greatly to be desired.

I would like to quote somewhat at length from Child's recently published book entitled, ''Conception and Sterility.'' He says, ''The congenital type of displacement is of particular importance and calls for an early replacement because the influence exerted by the continued displacement leads to permanent changes in the immature organ. In the acquired type, arising later in life, at a time when the uterus has achieved its full development, permanent pathologic changes are not so apt to occur. * * * Retrodisplacement of the uterus becomes an active factor in the causation of sterility in one of two ways, either the pathologic changes in the uterus resultant upon its abnormal position prevent conception or result in an interference with pregnancy when conception has occurred. * * * While it is quite true that the retrodisplaced uterus may become pregnant and that the pregnancy may even correct the displacement spontaneously as the uterus enlarges, the pregnancy going on to term, we know by experience that this is *the exception rather than the rule*.'' To these excerpts I would like to add the following from Graves, ''Women with retroversion are apt to be sterile, especially those in whom the retroversion is due to congenitally weak supports. In this case the sterility is the result of the displacement of the cervix uteri which no longer dips into the receptaculum seminalis. * * * Acquired malposition of the uterus may prevent or limit fertility. There is no doubt that women with acquired retroversion-flexion are in a large percentage of cases sterile. That the malposition is the cause of sterility is shown sufficiently well by the frequency with which

these women become pregnant after restoration of the uterus to its normal position." And the following from Crossen shows the same trend of thought: "Repeated abortion without apparent cause is another condition that should arouse suspicion of uterine retrodisplacement. * * * Sterility is in some cases, apparently due to retrodisplacement, though not as frequently as to anteflexion of the cervix and associated conditions. Not infrequently in a married woman who has long been sterile, pregnancy follows correction of the displacement. Occasionally the pregnancy follows so promptly as to leave little doubt that the sterility was occasioned by the displacement itself (compression of the tubes?) and not by any associated inflammatory trouble in the cervix or body of the uterus." The writer fully concurs in these opinions.

Where a congenital displacement of the uterus is associated with a short anterior vaginal wall, sterility is the rule. These cases are not relieved by the use of the pessary until the anterior vaginal wall is lengthened. When this type is also associated with an arrest in development of the uterus, which seems to be the rule, the latter condition will call for an active stimulation applied directly to the uterus. Probably the safest and best is the introduction of iodoform gauze tightly packed and allowed to remain for two or three days and repeated at frequent intervals until the depth of the uterus approaches or attains the normal. Hirst suggests electrical stimulation, which no doubt deserves more general use with careful record of results.

In dealing with long neglected displacements the writer has almost uniformly found pathologic changes not only in the uterus but in the adnexa. Often there were marked changes in the tubes and ovaries; the former congested, compressed and kinked. The ovaries were seriously involved; the capsule was much thickened and the parenchyma of the gland seriously atrophied, due, no doubt, to development of numerous cysts of varying size.

Reed in discussing the baneful influence of uterine retrodisplacements upon the procreative functions of the ovaries, makes the following statement: "Retrodisplacements of the uterus have a directly destructive effect upon the integrity and functional ability of the ovaries, and cystic ovaries with thickened tunics are an invariable accompaniment of chronic uterine retroflexions." The writer can verify this conclusion as true in every case of which he has had personal knowledge.

Reynolds also calls attention to the importance of this phase of the subject when he graphically challenges our thoroughness by saying: "The futility and injustice of the performance of an abdominal operation for sterility without attention to the needs of non-

ovulating ovaries is a very common mistake. * * * Prominent among the useless operations are those which are done for the relief of retroversion without recognition of one of the functional derangements of the ovaries which imply nonovulation, or of a preexisting anteflexion from the existence of short anterior attachments of the cervix.''

In the matter of treatment, the writer believes that uncomplicated retrodisplacements of the uterus can sometimes be corrected by the selection of a well fitting pessary, together with the use of approved hygienic and therapeutic measures. These are to be given a fair trial, but if results are not satisfactory operative intervention is imperative. This will at the same time give ample opportunity to correct any complicating or associated pathology in the pelvis or abdomen. Curettage and stem pessaries are here mentioned only to be condemned.

The writer's personal preference is for the Gilliam technic, and he avoids such modifications as the obliteration of the pouch of Douglas as suggested by Deniker, fearing complications during parturition. This objection is wholly theoretical; experience may prove this fear unfounded. In the cases where pregnancy is not a possibility the latter technic is undoubtedly an excellent safeguard against a recurrence of the retroflexion.

Dr. Dorsett, in a most interesting paper on this subject, reports ten cases of sterility successfully treated. One patient became pregnant following the use of a well fitting pessary, two after the use of a pessary and repeated dilatations, one following a Dudley operation, two after a Gilliam operation, one after an Alexander operation, two after a Gilliam operation and repeated dilatations, one following a Gilliam and Dudley operation.

In the last three years, the writer has successfully treated two cases of congenital sterility associated with hypoplasia, and five cases of acquired sterility, all by the Gilliam technic. All were due to retroversions, and all had sufficient pathologic lesions in the pelvis to warrant operative intervention in addition to the hope of a resulting fruitful pregnancy,—a hope that has been realized in each case.

CONCLUSIONS

1. Uterine malpositions are the cause of sterility in a limited number of cases, probably not over 10 per cent, which, though small, is quite too large to be negligible.

2. Long continued sterility or repeated abortions should lead one to suspect a displacement of the uterus.

3. Malpositions act as a cause for sterility by (a) mechanically interfering with the progress of the spermatozoa into the uterine cavity, and (b) by contributing to the functional disability of the

tubes and ovaries which when long continued, results in organic degeneration, especially in the ovaries.

4. In a very few well selected cases a well placed pessary plus wisely directed hygienic and therapeutic remedies should be given a fair trial.

5. Operative intervention is indicated in all cases where the foregoing treatment has failed, and where there is no legitimate contra-indication.

BIBLIOGRAPHY

Polak, John O.: Surg., Gynec., and Obst., xxiii, 261. *Child:* Conception and Sterility, 1922. *Winter:* Deutsch. med. Wchnschr., Berlin, 1921, xlvii, 765. *Seitz, A.:* Arch. f. Gynaek., 1920, cxiv, 141. *Crossen, H. S.:* Diseases of Women, 1917, p. 675. *Graves:* Gynecology, 1918, pp. 464, 558, 561. *Hirst, B. C.:* Intern. Clin., i, 65. *Reed, Robert T.:* W. Va. Med. Jour., xiii, 405. *Reynolds, Edw.:* Jour. Am. Med. Assn., lxxii, 1099. *Dorsett, E. Lee:* Jour. Mo. S. Med. Assn., xv, 350. *Frank, Jacob:* Jour. Am. Med. Assn., lxx, 985. *Holden, F. C.:* Am. Jour. Obstet., lxxxii, 415. *Anspach, B. M.:* Gynecology, 1921, p. 601. *Deniker:* Jour. Am. Med. Assn., lxxii, 1850.

7 EAST SECOND STREET.

FUNCTIONAL DYSTOCIA IN NORMAL PELVES: RECOGNITION AND MANAGEMENT*

BY JAMES A. HARRAR, M.D., NEW YORK CITY

THE recognition and management of functional dystocia may seem a superfluous thesis in these days of short cuts and time-saving obstetrics, but it becomes necessary sometimes to recite one's obstetrical creed just to be sure where one is. In obstetrics as in other branches of surgery there is usually more than one way to achieve a result, and one cannot be too dogmatic in insisting this method is always wrong and that one always right. In this discussion I shall present my personal preferences in treatment but I believe I am speaking for the majority of the staff at the New York Lying-In Hospital. Most of us have worked together so long that given an obstetrical situation the essentials in the management proposed would agree practically 100 per cent.

At the Lying-In, with its large indoor ward service and outdoor tenement service, it has been considered advisable to try out new procedures as they have arisen, limited only by the determination of making and keeping the hospital regarded as the safest place to have a baby. I believe we have extracted the beneficial elements from the employment of the Freiburg Dämmerschlaf, pituitrin, rectal examination, the low two-flap cesarean, median episiotomy and elective version,

without completely adopting any of them. All in all, guided by the successive hospital heads, the tendency has been to cling to the old doctrines and straight obstetrics. I might say we have not so much adopted this course as stuck to it.

WHEN TO INTERFERE

I chiefly desire to indicate the routine of procedure in handling tedious labors in normal pelves, that being employed year in and year out has given us the best results.

As it is impossible to define prolonged labor in an individual confinement in units of time it were better to pronounce a labor prolonged or delayed:

1. When there is primary inertia with ruptured membranes.

2. When despite good contractions there is no advance in cervical dilatation or in progress of the presenting part.

3. When there is advance, with increasing malposition.

4. When, due to the above causes, increasing tonic spasm of the uterus develops with continued ascent of Bandl's contraction ring.

5. Lastly and most definitely when the mother or child is showing signs of exhaustion.

Early recognition of organic abnormalities is not so difficult. With careful antepartum examination we can determine rather accurately the size of the bony pelvis, to a certain extent the size of the fetal head, and experience gives us a fair idea of the accommodation of a given head to a given pelvis. The compressibility of the particular head during labor, however, is something we cannot foretell. It is the functional abnormalities of dilatation, propulsion, high retraction of Bandl's ring, plasticity of the fetal head, tolerance of the child to pressure both of head and placental circulation, and increasing malposition that make such cases as I am discussing so treacherous. These abnormalities are ones that only can be appreciated as they develop during labor.

It is good practice for the nurse or attendant to count and record the fetal heart very frequently during active labor, the same as we learned it important to do in our study of scopolamin amnesia. This gives us a valuable chart of the baby's endurance. The first signs of distress on the part of the baby are disclosed by irregularities in the rate and rhythm of the fetal heart and usually before the passage of meconium is observed. Much overlapping of the cranial bones and the development of a very tense caput are also important evidence that the child is being subjected to dangerous pressure.

If labor is delayed, a sufficient number of vaginal examinations must be made to properly supplement the abdominal findings. If there is any question of cesarean section, examination to determine

progress may be made by rectum. We prefer, however, routine pelvic examinations to be made vaginally, but limit them to the fewest number possible. The hospital morbidity records are very satisfactory to us in a long series of cases handled with vaginal examinations both indoor and outdoor. Our figures for the past year are 7 per cent morbidity in the wards and 5.7 per cent in the tenement service. The outdoor mortality in 1921 was one maternal death in eighteen hundred confinements, including all-cases transferred into the hospital for delivery. We believe the routine vaginal examinations even made as they are by many students and internes, but with proper asepsis of hands and vulva, have been of greater teaching value than those made by rectum. An inexperienced student or interne can do considerable damage to the rectal mucosa. A rectal examination cannot disclose the hot, dry, swollen vagina of prolonged neglected labor, nor can it give a sufficient mental picture of the form or size of the pelvis of the woman perhaps first seen when in labor by the student, interne or consultant. The attendant must know accurately what is going on, and it is only by thorough familiarity with the normal mechanism that he may realize when things are not progressing as they should. The good old mechanism of labor, the stumblingblock alike of the professor trying to teach it and of the student trying to understand it, must still hold our constant bedside attention at every case. In case the slightest doubt remains as to the position of the head or the capacity of the pelvis, the patient should be put under an anesthetic and a thorough examination made. There are two main problems in prolonged labor: one of dilatation, and one of propulsion, and the solving of these still depends upon the understanding and regulation of the relation of the forces, the passages and the passenger.

HOW TO INTERFERE

If there are hard pains, with rigid cervix in the first stage, the use of morphine-scopolamin is frequently efficacious in controlling the mother's sufferings and preventing her nervous exhaustion while the cervix dilates. A constant observation in the twilight sleep use of scopolamin was the apparent minimum of uterine effort required in effecting smooth and rapid dilatation of the cervix. With membranes intact and dilatation slow, an additional freeing of the membranes for a couple of inches around the os keeps the case under our control much better than their rupture, and should first be given a trial, though in multiparae simple rupture at three to four fingers, with a cervix well effaced, will often be productive of a prompt delivery. As may be observed at cesarean section the membranes are chiefly adherent around the lower uterine zone and the more markedly so the less the cervical dilatation. It has also been recognized

by other observers that the physiologic adhesion of the membranes about the cervix when marked does interfere with the mechanism of retraction. When sufficient retraction has resulted in effacement but with dilatation still incomplete and the labor becomes prolonged, insertion of a bag is a most valuable maneuver to prepare the case for delivery. When we have primary inertia with ruptured membranes and cervix only one or two fingers and not effaced, packing of the cervix and upper vagina with gauze is usually of greater value in softening up the cervix and starting good pains than the bag. In this situation the bag does not always work so well. That there are certain limitations in the action of the bags we are forced to admit. Thus there are instances when by intermittent traction on the bag it is finally pulled through without any uterine contractions intervening. In others the presence of the bag excites pains, but as soon as it is pushed through, labor comes to a standstill. A larger bag does the same thing, and a long four to five finger cervix is left on our hands and the baby still undelivered. It is still too early for forceps and breech extraction after version through such a cervix is exceptionally hazardous even after manual dilatation.

Manual dilatation is only safely effected in a cervix that is pretty well effaced. Even then, except when only a remaining rim needs to be reamed out, there is danger of tearing and hemorrhage. Incidentally, before doing a version one of the most comforting methods I know in surely ascertaining that the cervix is completely dilated flush with the vaginal wall, especially if one's hand is not larger than a seven and a half glove, is to pass an easily sterilized object, such as a china nest egg, in advance of the hand. Then by grasping the egg, the fist can be made as large as is necessary to make it snugly fit the birth canal. As it is slowly withdrawn the resistance of any remaining rim of cervix can be sufficiently abolished to secure the ready passage through it of the aftercoming head.

If delivery is imperative, and the cervix is effaced and three to four fingers dilated but still too rigid to dilate manually without tearing, small snips with scissors on either side after the fashion of Dührssen's lateral incisions are of great value before forceps, and are especially to be thought of when the aftercoming head catches in the cervix. If any extensive enlargement is required or the cervix is not well drawn up, the anterior and posterior vaginal cesarean incisions are safest as further incising is better under the operator's control. In all incisions of the cervix it is well to remember that there is of course a lack of dilatation of the tissues between the incisions, and they are only to be used in definite emergency.

When dilatation of the lower soft tissue funnel, the levator ani margin and the urogenital septum becomes necessary, we are inclined

to prefer manual dilatation with plenty of lubricant and repair of such small lacerations as may be superimposed, restricting episiotomy to the cases when danger of a tear into the rectal sphincter is imminent, or when the baby is doing badly and must be instantly delivered. It is a matter of comment in the wards that there is more fever after the repair of episiotomy wounds than those of spontaneous laceration. Whether this is due to house surgeon's technic or to the opening up of less protected planes of tissue to absorption is subject to question.

Coming now to the delivery of the baby in prolonged labor. Close examination for anomalies of the baby's size, attitude and position will sometimes reveal the cause of the delay. Oversize, total or in part, such as hydrocephalus or abdominal ascites; attitudes of deflexion, especially brow, and failure of rotation in posterior position are to be carefully ascertained before attempting delivery. The use of pituitrin by the resident staff is not permitted before the birth of the baby, and is very rarely so employed by any of the attending staff. It is used rather frequently for postpartum bleeding before the full effect of ergot can take place.

With the head at or above the brim we have always favored version in preference to high forceps and still do. The case histories present 3298 versions as opposed to 814 high forceps, or in the ratio of four to one. Potter of Buffalo had laid emphasis on the combined advantages of a certain group of maneuvers in podalic version and breech extraction. The details are not new, but the combination results in such an excellent delivery as to give the name "Potter Version" to the operation. We are endeavoring to adopt this grouping of maneuvers when we have to do a version and most of us find each step the easier done in the way Potter practices. Even with improved results, however we still adhere to the old indications, and if we are doing a few more versions it is only because we are doing less high and hard median forceps. Version competes with high and hard median forceps, but we are not yet prepared to admit that it competes with low median forceps or in any way with undelayed spontaneous delivery.

Just here to reiterate for emphasis in breech extraction, one should always be prepared to make use of Dührssen's incisions should the head stick in the cervix, and to use forceps on the aftercoming head, also that Potter's practice of deep digital pressure exerted externally just back of the pubic bone is the most advantageous method of applying force, to the aftercoming head. Some operators are too prone to forget everything in the excitement of the moment but continual violent traction on the body of the baby.

The most frequent and most commonly unrecognized cause of delayed labor in normal pelves is failure of rotation with persistently

posterior position of the occiput. Most occiputs rotate and deliver without giving trouble, only a few become persistent.

In 8,360 recognized posterior occiputs in the Lying-In Hospital, previous to 1907, only 433 or 5 per cent required interference with artificial delivery.

To return to indications for interference, briefly, it is proper to interfere in delay due to a posterior occiput, (1) when despite good contractions there is no advance, or (2) when with advancement there is an increasing extension of the head.

Version with head above midpelvis in such conditions, manual rotation and forceps extraction with the head below midpelvis are the operations of choice. Molding of the head through the brim is no contraindication to version if under complete anesthesia the uterus relaxes with sufficient elasticity to readily admit the passage of the hand and wrist through the retraction ring. In fact a well molded head is much easier to deliver in the breech extraction after version than one that has not molded.

Complete Scanzoni rotation of the posterior occiput with the forceps is a dangerous procedure in most hands. If there is but slight resistance the maneuver is satisfactory and is a beautiful operation. But if at all difficult the leverage is so powerful that the anterior blade frequently cuts into the child's scalp and cheek just in front of the anterior ear and there is risk of high and deep vaginal tears. Under complete anesthesia manual rotation with external assistance is much to be preferred and is usually successful. I have yet to find a head that could not be rotated manually at least to the transverse position, and then by introducing the posterior blade first, the head can be pretty well held from sinking back into its former position while the other blade is applied and locked. Completing the rotation with the blades through one-eighth of a circle is simple and comparatively harmless.

I will not enlarge upon the subject of cesarean section in normal pelves, but there is undoubtedly a definite field here for the operation in oversized babies, in prolapsed cord with long poorly dilated cervix, in nonengagement with tonic uterus and live baby, and in cases of previous stillbirth from dystocia in what had been considered a normal baby and pelvis relationship.

Patience in obstetrics is next to asepsis, but it must be the active patience of close observation; not the passive patience of ignorance, allowing the mother to become totally exhausted or the baby in imminent peril of death before determining on a line of action. In prolonged labor, as thus defined, I believe any operative procedure is justified that will not injure the woman's health or harm the child.

100 East Sixty-sixth Street

PITUITRIN IN THE SECOND STAGE OF LABOR*

By MAGNUS A. TATE, M.D., F.A.C.S., CINCINNATI, OHIO

"PROGRESS in endocrinology can at best come only slowly and, to quote Rowntree, through correlated, adequately controlled investigations in which the findings are subjected to interpretations based on analytic and critical judgment. Endocrinology needs a leadership willing to admit the magnitude of its shortcomings. Its real contributions will then become more evident." Jour. Am. Med. Assn., July 22, 1922.

Along this line of thought a question of import to obstetricians is, whether it is wise and safe to use one of the endocrines, namely pituitrin, in the second stage of labor, and I bring this before you for your earnest consideration, not from the experimental but the practical standpoint. Thinkers and doers in medicine (according to the remarks made in a symposium at the last meeting of the American Medical Association), believe that many hurried claims *pro* and *con* have been made for the endocrines, which at the present time have not been substantiated. The reporting of remarkable results after meager experience, or the repudiating of certain of the endocrines with such statements that they are ineffectual or dangerous, is not convincing, and it seems to me, that we must look to future experimental, clinical and research work to elucidate the good or bad of the ductless glands. Query—are we collecting reliable data, or simply making statements without studying our own and other cases in detail from all angles?

I find that there is quite a divergence of opinion as to pituitrin, especially so when used in the second stage of labor, some stating that it is often accompanied and followed by serious consequences, others that if judiciously and obstetrically used, it is one of the remarkable discoveries of the age.

Pituitrin for obstetrical use is on the market as an aqueous extract from the posterior lobe of the pituitary body, ready for hypodermic use, and the dosage ranges from 0.5 to 1 c.c., to be repeated in half an hour, if in the judgment of the physician it is called for. This posterior lobe is described as a complex body, and when injected, causes or increases muscular contractions of uterus, strengthens and slows the heart beat, and by its contracting action on the arterioles raises the blood pressure. I use from 0.25 to 0.5 c.c., repeat once if necessary and never use over 1 c.c. in a given case, and in my experience pituitrin seems to be an ideal adjunct.

From the literature at my command however, where pituitrin was used in the second stage of labor, I find cases reported where the child was said to be asphyxiated, others where there was undue compression of body of child, cases of cerebral hemorrhage, separation of placenta, extensive lacerations of cervix and rupture of uterus. Some infants born alive developed paralysis and others became idiots and epileptics. I also find it stated that uterine tetany might occur following very small dosage.

The complications and sequelae mentioned above are of such import, that I bring up the question at this time, (knowing that many thousands of cases have had pituitrin administered to them during the second stage of labor), why such reported results should occur and what explanation can be given as a solution.

Is there some peculiar idiosyncrasy on the part of some pregnant women to pituitrin, is the fault in the preparation of the drug, is the dose or repeated dosage too large, are the indications for its usage properly considered, does patient's condition warrant its use, can its action be relied upon, and are not some of the complications attributed to pituitrin erroneously reported?

Time and clinical experience are the essentials necessary to assure us, that either we have something of great value, or that pituitrin should be classified as a dangerous drug and unworthy of use when administered during the second stage of labor. I note that many who use pituitrin extensively have become enthusiastic, and that they even go so far as to state, that to a great extent, it takes the place of forceps, without the frequent resultant effects of instrumental trauma.

It is necessary to have in mind, that there are definite contraindications, and they may be enumerated as follows: incomplete dilatation of the os, nonengagement of presenting part, any mechanical obstruction to delivery on the part of pelvis, uterus, bladder, vagina, rectum, or of child, any disproportion of fetal or pelvic measurements, abnormal presentations, uterine inertia following a long and harrowing labor, the patient being thoroughly exhausted; especially is this so in the tuberculous and syphilitic.

Its usage may be summed up as follows: it starts, renews or increases feeble contractions of uterus in suitable cases.

That pituitrin used indiscriminately may be a contributing or even the main cause of one or more of the above-mentioned complications is self-evident to the intelligent. It is not convincing, however, to read some of the case reports where pituitrin is put down as the cause of an unusual complication or of death of patient.

Such criticisms without complete histories of pertinent facts or condemnation of the drug when erroneously used, are of little value

from a statistical standpoint of the merits or demerits of the drug in question, and leaves those seeking enlightenment in the same position as before perusing such reports.

It is only rational to say, that if midwives are allowed to administer pituitrin, disaster will follow in many unreported cases, and if physicians discard obstetrical contraindications, serious complications will ensue, and especially is this so, if used in every case where there is the least delay, regardless of presentation or position, or where there is a temporary cessation of labor pains with the os only partially dilated.

It is of little moment whether one decries those who condemn pituitrin in the second stage of labor, or praises those who consistently use it, but it seems to me that obstetricians are called upon to give their unbiased opinions of pituitrin, based upon their own experience, so that some definite conclusion may be reached, which will be of value to the profession at large.

I have used pituitrin in the second stage of labor for a number of years, and during the past year in 30 selected private cases, and after mature thought and careful observation have come to this conclusion: that if used judiciously from an obstetrical standpoint, it is a boon to motherhood.

10 WEST SEVENTH STREET.

MALFORMATIONS OF THE UTERUS AND APPENDAGES*
WITH A REPORT OF SIX CASES

BY ARTHUR T. JONES, M.D., F.A.C.S., PROVIDENCE, R. I.

MALFORMATIONS of the uterus, appendages, and vagina are dependent chiefly upon some fault in the normal development and fusion of the ducts of Müller.

In the normal course of development the upper portions of the ducts of Müller, although separate, converge, forming the fallopian tubes; the middle portions fuse, and the partitions between them disappear, forming the uterus, while the lower portions by similar fusion and absorption of partition, form the vagina. Any interruption in this normal fusion and development may leave more or less of a double canal in the uterus or in the vagina, and depending on the equality or inequality in the development of the two halves, there may result, either a symmetrical double uterus and vagina or one-half may be well developed while the other half may present all grades of development from zero to perfection.

There are rare conditions of absence of the uterus, and rudimentary uterus, in which the latter organ is represented only by a band of connective tissue posterior to the bladder. For pregnancy to exist, at least one of the ducts of Müller must have developed sufficiently to form a serviceable half of a double uterus and vagina. There are many varieties of malformations most common of which are: 1. The uterus unicornis, in which only one duct of Müller is developed. 2. The uterus bicornis, in its various forms, in which both ducts are equally developed but there is fault in normal fusion and absorption. 3. Uterus bicornis in which one duct is imperfectly developed and has no connection with the vagina. 4. The uterus didelphys in which the halves are separate throughout. 5. The uterus septus, in which externally the uterus feels normal, but the partition between the middle portion of ducts of Müller has never absorbed. 6. Uterus bipartitus, in which both uterus and vagina are double and lie side by side as separate tubes. 7. Double vagina, in which fusion, absorption and development of the ducts of Müller are normal until the vagina is reached and here a partition is left dividing the vagina throughout more or less of its length. In any of the above mentioned, pregnancy may take place.

Several types of abnormalities of the uterus and appendages together with vagina or abnormalities of any one respectively have been described, among which may be mentioned double uterus with double vagina; congenital absence of uterus and vagina; absence of uterus both tubes and right ovary; double vagina plus double cervix; absence of vagina and uterus; double solid uterus; double lumen in fallopian tubes; congenital absence of uterus alone with tubes and ovaries present; and congenital absence of uterus with anomalous vulvovaginal anus.

The following cases which have come under our observation are of particular interest due to abnormalities presented:

CASE I.—I. P., female, age twenty-six, white, married, complaining of a tumor which she discovered following her last miscarriage. Patient had one child three years ago, two miscarriages, last one about two months before she was seen by me. Menstruation regular. Examination showed a large cystic tumor in pelvis, which pushed the uterus well over to left side. Cervix small and high up. Diagnosis of ovarian cyst was made. Patient was operated on August 26, 1915, at which time a cyst of the right ovary was found the size of a grapefruit. The cyst and tube were removed, it not seeming feasible to attempt to save any portion of the right tube because of the pathology attached to it. The left side of the uterus was found to be perfectly smooth and with no appendage. The left round ligament was inserted into the uterus below the junction of the cervix with the body of the uterus. Further examination revealed an ovary twice its natural size and a tube one and one-half inches long on the left pelvic wall attached by the broad ligament. The left tube was cut across and the cut end split up a distance of one-fourth of an inch for transplanting into the uterus. The end of the right tube was excised from the horn of the uterus and incision carried inward opening into the cavity of the

uterus. The left tube was then transplanted into the horn of the uterus at this point. Two strands of No. 2 chronic gut were then passed through the tube into the uterine cavity with the ends protruding from the tube to keep the same patent where it was grafted into the uterus. The left ovary which then lay close to the uterus and on top of the round ligament was sewed to the round ligament closing the opening, which would predispose to ileus. The patient made an uneventful recovery. Two years after operation the patient reports menstruation regular every four weeks, not painful, moderate amount for four days. No pregnancies since.

Case II.— G. N., female, age twenty-four, white, married for three and one-half years. No pregnancies. Nothing abnormal in regard to her menses. Examination revealed an ovarian cyst. At the time of operation, May 19, 1915, a cyst of the left ovary was removed. At the left of the uterus was a small mass which at first looked like a fibroid the size of a walnut. The left tube and round ligament, however, came off from this left horn of what was really a bicornate uterus, the left side being much less developed than the right. This supernumerary uterus was removed. The round ligament was tied and cut away and then sewed to the horn of the uterus proper. Beneath the supernumerary uterus where it was cut across was a slight area of thickened tissue apparently a small mass of uterine tissue simulating a cervix. The patient made an uneventful recovery.

Two years later the patient was delivered of a baby girl. This child was seen in consultation about five months after birth and was a Mongolian idiot. Patient has since given birth to a normal healthy infant.

Case III.—C. W., age thirty-four, white, married five years, menstruation normal. Had one miscarriage at two months. Patient had been delivered of a six and a half months fetus two weeks before first seen. Four days before labor she complained of pain in her left side, also noticed a tumor following her delivery. Examination showed presence of large tumor in left side of abdomen and pelvis, apparently connected with the uterus. The uterus seemed small however. Diagnosis of a tumor made. When operated, April 10, 1920, which was twenty-six days after delivery, the tumor mass was found to be the left horn of a bicornate uterus and was the size of a coconut. A definite sulcus seemed to divide this horn from the right side; the latter seemed about the size of a normal uterus. The transverse colon was adherent to the left horn of the uterus where the latter had perforated. Nature had closed the opening by causing the colon to adhere at this spot. Upon separating the adhesions the perforation was found in the uterus and a dark grumous discharge came from the cavity of this uterine horn. The entire right side of the uterus was removed along the dividing sulcus. Examination of the removed left horn showed the mucous membrane very dark, grumous looking and thrown into heavy folds. It was evident from the gross appearance, that the pregnancy had occurred in this horn, which had failed to involute and the ulceration had occurred at the fundus where Nature had temporarily taken care of it. A pathologic examination showed an excess of fibroid tissue but nothing else abnormal.

Patient made an uneventful recovery. She was seen within the last few months and is in excellent condition. No pregnancy since operation April 10, 1920.

Case IV.—B. S., white, age thirty-five, seen in 1911, suffering from a tubo-ovarian abscess. Although married for several years she had had no pregnancy. On examination of her pelvis it was found that a double vagina was present and apparently a double uterus for there was a semblance of a cervix in both sides. This patient declined operation and passed from under my observation, so I was unable to get further knowledge regarding her congenital malformation.

Case V.—M. A., female, white, and single. Operation on December 14, 1907, at which time a curettage, celiotomy, salpingo-oophorectomy, appendectomy and a plas-

tic of the left ovary was done. At the time of the curettage an os was found, which presented in the right side of the vagina, and communicated with the right side of the uterus. The tissues about the os seemed soft and like vaginal wall only. A cervix was also present in its normal position and felt normal but was covered with vaginal mucous membrane and presented no os. At the time the celiotomy was done the mass in the right side proved to be tube and ovary of a cystic nature and appendix all matted together. The appendix was removed, right tube and ovary freed and removed. The left ovary was cystic and a plastic was done on it removing about one-half. The uterus was found to be bicornate and symmetrical on both sides.

CASE VI.—A. A., age thirty, white. First seen in January, 1919. Married four years, child three years of age, instrumental delivery, following which the patient was in bed seven months suffering from phlegmasia alba dolens and other complications. She complained of heaviness in pelvis and dragging sensations. Menstruation every 28 days, not painful, five days, moderate amount. Examination revealed a small laceration of the cervix and perineum and a marked cystocele. A dilatation and curettage, trachelorrhaphy, anterior colporrhaphy, perineorrhaphy and celiotomy done. Upon opening the abdomen a condition of congenital absence of right ovary and tube was found and a condition of hydrops of the left tube. Plastic operation was done on left tube. The distal end was opened and a new fimbria made by suturing around the slit in tube with fine chromic gut. Patient was discharged well in eighteen days.

The conclusion we can draw from this review is a plea for conservatism and operations of a plastic nature to be resorted to rather than a complete removal of the female organs of regeneration. We should watch for uterine malformations, which constitute an actual clinical group and whose management requires conservative surgical judgment.

REFERENCES

(1) *Robertson, B. O.*: Southern Med. Jour., March, 1920, xiii, 265. (2) Surgical Gyn. and Obst., July, 1920, xxxi, 15. (3) Jour. Am. Med. Assn., Sept. 25, 1920, 877. (4) *Jackson, C. E. S.*: British Med. Jour., Feb. 7, 1920, i, 185. (5) *McLoreman, M.*: Med. Jour., Australia, July 5, 1919, ii, 5. (6) Surgical Journal Obstetrics, Nov. 19, 1919, xxix, 485. (7) *Wilhelm, F. E.*: Jour. Missouri Med. Assn., Sept. 19, 1919, xvi, 295. (8) *Struck, E. J.*: Am. Jour. Society of Obstet., July, 1918, xxvii, 97. (9) *Metcalf, H. E.*: Jour. Am. Med. Assn., Jan. 5, 1918, lxx, 20. (10) *Novak, E.*: Surg. Gynec. and Obst., Nov., 1917, xxv, 532. (11) *Laurie, R. D.*: Brit. Med. Jour., Jan. 9, 1917, i, 764. (12) *Ward*: Postgraduate Hospital, 1908, xxix. (13) *Oliver*: The Lancet, London, 1912, i, 1609. (14) *Robinson*: Alabama Med. Jour., 1900, xxxiii, 152. (15) *Royster, H. A.*: Am. Jour. Surg., May, 1922, xxxvi, No. 5.

131 WATERMAN STREET.

SHOULD PUBIOTOMY BE RECOGNIZED AS A JUSTIFIABLE OPERATION IN OBSTETRICS?*

By Arthur H. Bill, M.D., Cleveland, Ohio

VERY little mention has been made during the recent years of the operation known as pubiotomy. This operation was never popular in this country; in fact, we may say that in only very few of our clinics was it given what might be called a fair trial. Many obstetricians rejected the procedure before using it, while others apparently did not meet with success on attempting it, or at least the procedure did not appeal to them. We may say that pubiotomy has had a rather rough road to travel on its way to finding a place of recognition as a valuable obstetric procedure.

Probably one of the underlying reasons for discrediting pubiotomy is the fact that its proper place was not fully realized and that there was always a tendency to compare it with cesarean section, as if the two operations were competitors, in which case opinion invariably and very rightly remained favorable to cesarean section. The fact should be made very clear that pubiotomy in no way competes with cesarean section; in fact, its advantage is seen in those cases in which we know that cesarean section is either contraindicated or its performance is an impossibility. It competes chiefly with craniotomy on the living child, and in this connection it may be said that it makes little practical difference whether the physician deliberately perforates the head of a living child, or, knowing that its successful delivery is impossible, makes brutal traction with forceps until he finds that there is no longer a fetal heart and then perforates the head. The writer believes that craniotomy is used far too often; in fact, that it is very seldom necessary.

In the last decade, we have seen some wonderful changes in obstetric practice, so much so that today obstetrics is on a far more scientific basis than ever before. We have shown that it is possible by the proper administration of analgesia and anesthesia to make labor quite comfortable and do that without interfering with its most successful termination. We have learned that it is possible to shorten the second stage of labor with safety. We have adopted the practice of correcting abnormalities of presentation and position instead of waiting indefinitely for Nature to correct them, because in a certain percentage of cases spontaneous change to a normal position takes place, but perhaps after many hours of unnecessary labor. We have

learned to make rectal examinations during labor instead of vaginal examinations, thus further decreasing the possibility of infection. We have seen that it is possible to reduce the maternal mortality in cases of antepartum hemorrhage, for example, placenta previa and accidental separation of the placenta to an almost unbelievable minimum by the proper employment of transfusion with the delivery. We have seen a very marked reduction of severe postpartum hemorrhage by the routine administration of a pituitary preparation, immediately after the birth of the child. We have seen a broadening of the field for cesarean section so as to include quite a variety of conditions, and yet we have learned more fully its limitations. We have been impressed more and more with the fact that there is great risk in performing a cesarean section in cases in which any attempt at delivery or any vaginal manipulation has been made, where any vaginal examination has been made or even when the patient has been in labor too long. In fact, the conditions mentioned are considered contraindications to the use of cesarean section. But in spite of all the advances in obstetric procedure, we still have craniotomy. In overcoming the necessity of performing the latter operation, pubiotomy finds its place.

It is undoubtedly true that were the best judgment used in the management of cases from the beginning, there would seldom be an indication for pubiotomy. That is, if the most accurate estimation of the relative size of the fetal head and the bony pelvis were made, and if only rectal examinations were made during labor, and the patients not allowed to continue in labor too long, in other words, if the cases were always kept as what we term clean cases, cesarean section could be safely performed when occasion arose. But unfortunately, in a certain percentage of cases, this is not true. In these, the patients are allowed to continue in labor in spite of dystocia due to the bony pelvis, repeated vaginal examinations are made, as is still the custom of many physicians, and even unsuccessful attempts at delivery. In these so-called potentially infected cases, we all realize the risk of performing a classical cesarean section and we might well add that the various methods of extraperitoneal or transperitoneal cesarean section have not materially lessened the danger in such cases. In these cases the fetal heart may still be good and the justification for performing a craniotomy cannot be shown. Pubiotomy gives us a means of delivering a living child and there are not the contraindications to it which there are to cesarean section. There is no invasion of the peritoneum or of the uterus and not frequently even a communication between the pubiotomy wound and the vaginal tract. There is, in other words, no more reason why pubiotomy should be contraindicated than craniotomy in a potentially infected

case. The justification of pubiotomy as an obstetric operation may be determined by the ultimate results, which involve chiefly the question of the character of the union of the pubic bone and the functional results obtained, inasmuch as, the various complications which have been reported and are of a permanent nature may be avoided by care in the performance of the operation. In my own experience, there has always been firm union of the bone, but this is in most cases a fibrous union. Radiographs taken at times varying from one to twelve years after the operation have shown in most cases fibrous union with slight separation of the bony surfaces, while in one case, there was such a perfect bony union that it was scarcely possible to determine from the radiograph on which side of the symphysis the cut had been made.

The functional results were, however, uniformly good whether a fibrous or a bony union resulted, the patients being unhampered in the performance of their respective duties, which varied from the work of a scrub woman to the strenuous exercise of the athletic woman.

Probably the most striking advantage of pubiotomy is shown in the delivery of the aftercoming head by the use of what has been termed the prophylactic saw. When the fetal head is at the fundus, as in the case of a primary breech presentation, and there is a moderately contracted pelvis, the obstetrician is in a very disadvantageous position. Pelvic measurements are after all only relative, and measurements of the fetal head as it lies in the fundus are inaccurate. The real estimation of the possibility of the head passing through the brim of the pelvis can only be made when the head is presenting and one can determine the relative size of the fetal head and bony pelvis. In some cases the obstetrician comes to a full realization that the fetal head will not pass through the brim only when he has reached the stage of the delivery of the aftercoming head. He is then helpless. If, in cases in which there is uncertainty in regard to dystocia, the prophylactic saw is passed around the pubic bone before the delivery, and simply allowed to lie in place without sawing, it is possible to release the fetal head in time to save the child if an absolute obstruction is found. If the aftercoming head is delivered without difficulty, the fact that the saw has been passed is in no way harmful to the patient. The same procedure may apply to cases in which the best judgment of the obstetrician tells him that he may be able to deliver a child by means of podalic version better than by forceps. If his judgment fails him, and the aftercoming head does not enter the pelvis, he will be very glad to have a prophylactic saw in place. One more example of the peculiar value of pubiotomy is seen in cases of contracted pelvic outlet. If the fetal head has

been brought down to the outlet and there has met an obstruction, pubiotomy offers the only means of delivering it.

I have made no attempt at giving an exhaustive description of the operation of pubiotomy with which you are all undoubtedly familiar; have said nothing of the history or bibliography, nothing of the technic, and have not bothered you with case reports, though I might add that I have performed pubiotomy operations successfully in all of the varieties of cases mentioned. My intention has been merely to emphasize the fact that in certain cases, pubiotomy offers us something which no other obstetric procedure can replace. Let me make it perfectly clear that I do not consider pubiotomy to be an elective procedure, but merely an emergency operation, to be applied in those cases in which the child cannot be saved by other means without seriously endangering the life of the mother. I would not even advocate a broadening of its field and would especially speak against reckless performance of podalic version in cases of contracted pelvis under the safeguard of the prophylactic saw. In view of the peculiar advantages of pubiotomy, as described, and the favorable results, and in spite of the fact that the procedure *per se* is not especially attractive, can we not conclude that it deserves to be given a definite place among our valuable obstetric procedures?

503 OSBORN BUILDING.

REPORT OF A CASE OF GENITAL ABNORMALITY AND ACUTE APPENDICITIS IN A GIRL OF EIGHT*

BY H. WELLINGTON YATES, M.D., DETROIT, MICHIGAN

ON March 31, 1921, through the courtesy of Dr. S. R. Ashe of Detroit, I was asked to see Mildred K., a girl of eight years of age, who had been ill for forty-eight hours with an acute pain in her abdomen, at first not well localized, but during the course of the next forty-eight hours, there were definite signs of an acute appendicitis.

This patient was the third child born of a healthy mother whose labor was attended without incident. Three children have since been born to the same mother and all are healthy and well.

The patient's infancy and early childhood were free of disease except measles at four years of age, she was fat and well nourished until that time, after which she has been very thin and apparently poorly nourished. While she eats very heartily of anything served, frequently demanding food between meals, she remains phys-

ically below par. Her bowels are regular and she has no digestive disturbances. While she urinates every half hour night and day, the urine is negative. She always has a dysuria and has to wait a considerable time before urination takes place.

Her mental capacity is that of a normal child of her age. While at home, she prefers to sit at the window and watch other children at play rather than to take any active part in childish games.
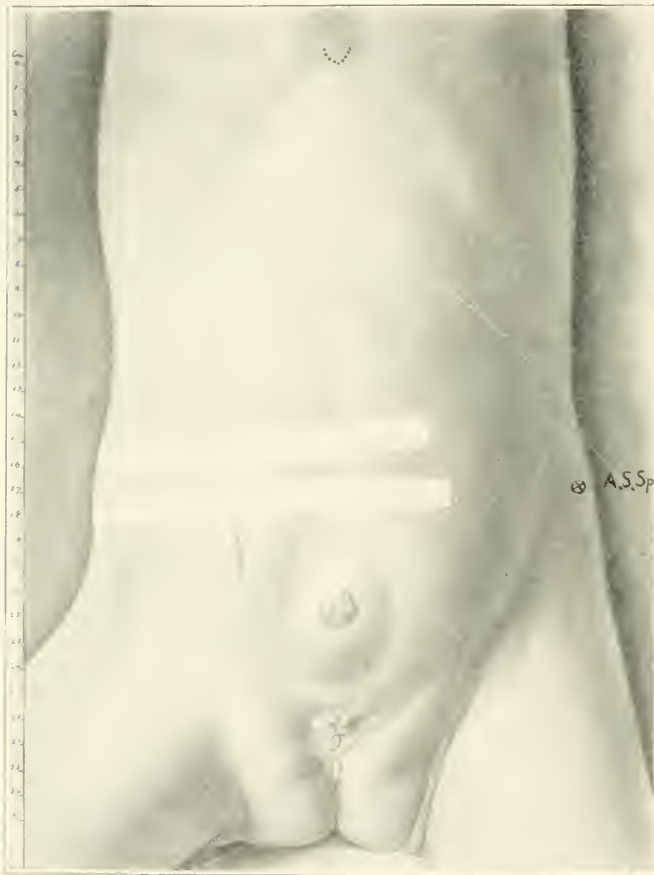
Fig. 1.

The patient was transferred to the William Booth Memorial Hospital where operation was immediately done. An incision was made over McBurney's point. When the peritoneum was incised, a considerable amount of seropurulent discharge was liberated. With the index finger in the cavity, the appendix was easily found; brought into the wound and dealt with in the usual manner.

With the examining finger one could detect a partial walling off from the area below, making it inadvisable to do any further explora-

Fig. 2.
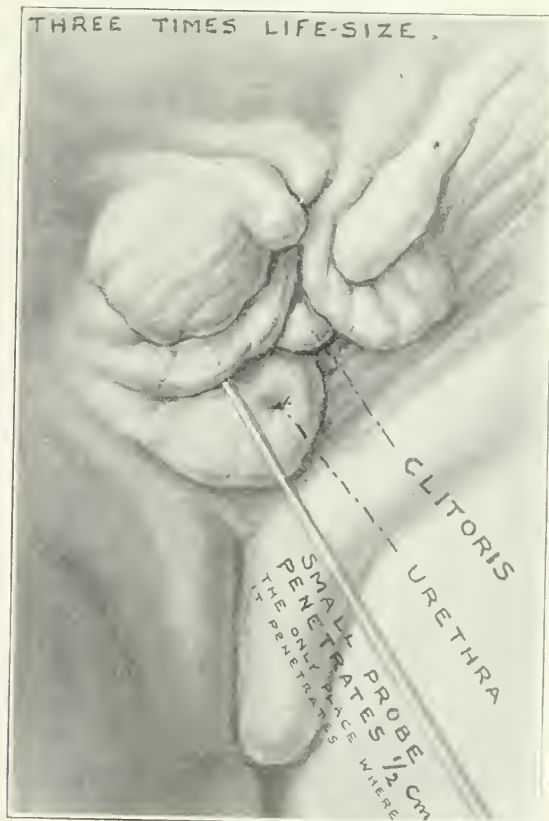
Fig. 3.

tion in the pelvic cavity to determine the normalcy of its contents. Accordingly a drainage tube was inserted in the lower angle of the wound and the incision closed from above downward. The drainage tube was removed on the sixth day. She made an uneventful recovery after the first two days of stormy convalescence and was discharged on the eleventh day with the wound completely closed.

Incident to these examinations her urogenital deformities were observed. The following anomalies· were in evidence:

1. The umbilicus appears about nine cm. below its normal location. (Fig. 1.)

2. There was a diastasis of the recti muscles extending from a line drawn transversely from the anterior spines of the ilium downward for 7.5 cm. and separated at its widest portion 4.5 cm.

3. There is an apparent exstrophy of the bladder, through this diastasis up to and immediately beneath the integument. It is in the center of this apparently exstrophied part that the umbilicus is seen.

4. We were unable to feel any union of the pubic bones—the ramus of each side apparently dipping down without fusion.

5. The external genitals are seen in irregular and undefined folds, the clitoris alone appearing most normal. The urethral meatus is very small, scarcely admitting a uterine probe, the nymphae were so immature that they could only be distinguished with difficulty and in no sense were a guide to the stream while urinating, so that during urination the urine was thrown upward toward the abdomen.

6. The vagina was entirely wanting, unless perchance it could be marked by a slight aperture which admitted the smallest probe for about one-half cm. Repeated attempts were made to carry the probe farther in without success. (Fig. 3.)

The x-ray examination (by Dr. G. C. Chene) made Sept. 15, 1922, showed an arrest of development of the pubis and ischium on each side. This is a condition seen in extroversion of the bladder. The anterior part of the pelvic girdle is deficient, the pubic bones being separated by about three inches. The pubic bones and ischii are directed forward instead of toward the mid-line and the obturator foramina are small and face laterally. The iliac bones appear flatter than usual and face more forward. The pubis and ischium have united properly on their respective sides. (Fig. 2.)

Recalling for the moment the early developmental phenomena connected with the genital system, we find the development of the wolffian bodies at about the end of the fourth week of embryonic life. Just inside of these bodies the elements of the genital glands which in the future become the ovaries of the female are seen about the sixth week. Coincidentally with the development of the genital glands there are seen two ducts which extend to the urogenital sinus; these are the müllerian ducts, from which is developed the entire genital tract to the vaginal introitus.

The müllerian ducts are at first solid and when they extend to the urogenital sinus they are unfused structures. When the development proceeds normally they run close together in their lower half and finally become merged into one structure, the upper part of this structure becomes the future uterus and its extension and fusion in collaboration with the urogenital sinus forms the vagina. These latter changes occur about the ninth and tenth weeks. When these tubes fail to reach the urogenital sinus the vagina ends blindly above the vestibule; or when their lower segments are stunted, the vagina and often the uterus may be entirely wanting. Congenital malformations of the vagina such as absent or rudimentary vaginae are usually associated with corresponding errors in the development of the uterus. While other malformations due to faulty union of the müllerian ducts occur, the more common is the uterus bicornis or a double uterus and vagina; the latter are not incompatible with pregnancy, labor and the puerperium, often occurring without unusual incident; this phenomenon is often not recognized since no external evidence is seen. Conception may occur on either side. We have observed one case of abortion about the sixth week which had a complete vaginal septum and a double uterus, excepting that the latter also had a septum between two otherwise normal uterine cavities.

Complete vaginal absence is seldom found in any but nonviable monstrosities according to Anspach, but the case reported rather refutes this statement. Marked vaginal atresia may be the result of a vaginitis of gonorrheal origin, but complete congenital atresia is associated with anomalies in the development of the müllerian ducts and under those circumstances is always associated with abnormalities of the uterus and adnexa of one side. A true atresia of the vagina must be differentiated from the inflammatory type which is but the result of some acute infective agent.

DAVID WHITNEY BUILDING.

THE TRAGEDY OF A SACRAL PERIOSTEAL SARCOMA*

By Francis Reder, M.D., St. Louis, Mo.

THE etiologic factors of malignancies still remain labyrinthine to
the great army of research scientists in their indefatigable search
for a cause, while the therapeutic agencies generally in vogue at the
present, leave the impress of an alchemistic effort. Wonderfully
great have been the achievements of the physicists in constructing
a most powerful x-ray apparatus of high voltage capacity to be
utilized for the production of the hard x-rays, and equally wonder-
ful have been the advancements made in the utilization of the highly
penetrating gamma rays of radium. It has carried many of us into
the ultraenthusiastic zone, and has caused us to become infected with
much of the fervor of our inspired colleagues who are visualizing
marvelous successes with the x- and radium rays. In time we have
infected our patients with this selfsame enthusiasm, and implanted
in them a hope for which we must feel responsible.

I admit that it is a great comfort to be relieved of a patient with
a malignancy in which surgical measures have failed, and to be able
to find hopeful recourse in a new branch of medicine whose success
is proclaimed with convincing earnestness.

Well be it that access to such encouraging aid is at our disposal,
for were it not, the spirit of the surgeon and the patient would soon
be daunted and hope lost. Hope, though the patient's condition
presages no encouragement, must not be lost, for this virtue is the
vitalizing bond which unites the soul to the great and good in every
age, it is a link whereby our life takes hold upon the eternities to
come.

In narrating the clinical history, course and treatment of this
particular case, I am merely portraying to you a clinical picture,
which, during the first six months, misled the skill of an able physi-
cian; a clinical picture revealing the suffering and courage of the
patient, and a clinical picture disclosing the great disappointment
engendered by the most modern methods of treatment.

This patient experienced some two months before consulting a rectal specialist
a heavy, throbbing sensation, with occasional lancinating pain in the lower part
of her rectum. Six weeks after the onset of her "rectal trouble," bowel actions
were becoming painful. The rectal specialist recognized the condition as "Hemor-
rhoidal" and for five months gave assiduous treatment, without relief.

On May 25, 1921 I saw the patient, a woman forty-five years old, well developed
and fairly healthy looking, her face, however, giving expression of much suffering.

The pains in her rectum had grown more severe, especially at night, and were radiating up her back, causing her sleep to be much disturbed.

Rectal examination conducted in a very gentle manner, and without instruments, caused intense pain. Several small internal hemorrhoids were palpable. They were, however, too small to cause such suffering. Insinuating my finger to its full extent into the rectum, the anterior surface of a mass about as large as a tangerine, globular in shape, could be palpated through the posterior wall of the bowel. The location of this mass corresponded to the sacrococcygeal joint. To the sense of touch this mass appeared soft, doughy and fixed. The diagnosis of a sarcomatous growth was made. The likelihood of a cystic tumor (dermoid) was not altogether excluded, although any evidence on the skin usually associated with this class of tumors was entirely lacking. Sentiment was greatly responsible for entertaining the latter diagnosis.

The condition was clearly a surgical one and a request for operation was promptly accepted.

On May 27, 1921, with patient in the Bozeman position the tumor mass was excised. On account of the character of the lesion extreme measures were resorted to in dealing with neighboring tissues.

The coccyx and a portion of the sacrum corresponding to a line drawn a little above the second sacral foramen, were removed. The musculature of the posterior wall of the rectum to the extent of 2 to 2½ inches was removed down to the submucosa.

In dissecting out the tumor mass, which was globular and as large as a small tangerine, no difficulty was encountered. It was readily enucleated. The reddish brown color and characteristic substance of the tumor made recognition easy as soon as the "capsule" was incised. In using the word "capsule" in connection with this tumor, I am simply stating the gross appearance of the tissues as they presented themselves during the dissection. In this particular case the appearance as to an encapsulation of the mass was strongly deceptive.

Pathologists inform us that sarcomata are not encapsulated; that a microscopical examination of the capsule and of the tissues immediately outside of it shows that what appears to be a capsule is the connective tissue around the periphery of the tumor, which tissue had become condensed by pressure, but which holds in its meshes young sarcoma cells, which are also found in a zone of lesser or greater width in the adjacent tissues; furthermore, the enucleation of a sarcoma is invariably followed by a speedy local recurrence, the best possible proof that the "capsule" does not indicate the limits of the tumor, and is in reality a pathologic delusion.

This teaching was keenly appreciated, and the "capsule," after its interior had been subjected to an application of carbolic acid, was excised together with a liberal encroachment upon the adjacent tissues. The wound was closed excepting at the lower corner where a rubber dam drain was inserted. Healing was by first intention and on June 11, 1921, sixteen days after the operation, the patient left the hospital free from any pain and feeling well.

The pathologist's report of the tumor was alveolar sarcoma. Appreciating the virulent character of the neoplasm a "radium treatment" by a most competent radiographer was given June 3, 1921, and July 3, 1921. The total time for both radiations was 30 hours, 4500 mg. hours, 150 mg. of radium filtered with ½ mm. of silver, 1 mm. of brass, 1 mm. of lead and rubber at 2 cm. distance, were administered. These radiations were very painful for almost 60 hours after their application, and demanded the administration of an opiate for relief.

The patient's improvement was most encouraging. She appeared normal in every way, strength returned, she gained in weight, and her face reflected an ex-

pression of euphoria. Nevertheless the patient was kept under close surveillance and was subjected monthly to an examination. All went well, when on Oct. 22, an examination imparted to the examining finger a sense of thickening. This sense of thickening was apparent through the posterior rectal wall and in the vicinity of the former site of the neoplasm. The patient was not conscious of the existing condition, as she had not experienced any pain. Nothing was said to her. She was asked, however, to return in November for further observation. An examination on Nov. 25 removed all doubt about a recurrence vaguely entertained at the October examination. The thickening at that time too indefinite for a positive interpretation, had progressed so that a distinct infiltration of the tissues beyond the rectal wall could be readily recognized. Pressure too, now caused pain.

The patient was informed of the recurrence and before any advice could be offered, she requested an operation without delay.

The operation was performed at St. Luke's hospital Nov. 30, 1921, six months after the first operation. At the operation which was exceedingly severe, no encapsulated neoplasm was found. The tissues about the former site of the tumor presented a strongly infiltrated appearance. It was very difficult to judge the tissues during the progress of dissection. The points of limitation in the dissection were the tuber ischii. Before closing the wound a cautery at a dull heat was applied both to the soft and osseous tissues.

The patient reacted well from the operation. Healing progressed without infection and the patient was able to leave the hospital January 1, 1922.

During the patient's stay in the hospital she was given the treatment by the mixed toxins of erysipelas and Bacillus prodigiosus of Coley. The injections, given irregularly, were governed by the patient's condition. The reaction, i.e. chill, fever and depression following an injection were sometimes very severe,—even in the most minute dose (½ minim). An injection of 4 minims given Dec. 18 caused a very severe chill, a temperature of 104½° F. following. On Dec. 1, 1921, the first injection was given. On Dec. 24, 1921, an injection of 5 minims was given and no reaction followed. From that date on the injections were discontinued.

To give the patient the benefit of the advancement developed by the Coolidge tube treatment technic of deep radiation, the area harboring the neoplasm was exposed to these high voltage tubes from January 23, 1922 to March 14, 1922. The number of treatments given were 12, they were administered at an average of twice a week. The length of a treatment to the posterior rectal region was 75 to 150 milliampere minutes (75 milliamperes equal 15 minutes). The tube distance was 65 cm. and a current of 210,000 volts was utilized. An intermission from Feb. 10, 1922 to March 3, 1922 became imperative. The reactions were very severe. Pain was intense and nausea and vomiting frequently distressing. These constitutional symptoms usually continued for 72 hours and called for an opiate for relief. It was noted that the usual and expected increase in the resistance did not occur during the first four treatments. During an examination at patient's home Feb. 22, 1922 there was an apparent change in the affected area. To the touch per rectum the tissues felt hard, resistant and possessed of a peculiar elasticity; prior to the treatment they imparted a soft and doughy sensation. Although the patient was free from pain, slept well, had a good appetite, was gaining in weight, doing much of her house work, a suspicion that a dissemination of the pernicious tissue cells was active, could not be discountenanced. From March 3, 1922, to March 14, 1922, additional five treatments were administered, two of these treatments being anterior rectal.

The time and voltage of each treatment was the same as the preceding treatments. Similar reactions, perhaps in some instances more severe on account of the

weakened condition of the patient, were experienced as in the first series of deep therapy treatment.

March 3 further irradiation was discontinued in the hope that the patient's resistance would become greater and permit further treatments.

During the course of the deep irradiation treatment at five different times a hematoma appeared in the posterior rectal region which caused much pain by pressure. The hematoma was punctured and the blood which was almost black and liquid, showing not the slightest tendency to coagulate, was evacuated. The amount usually ranged from 200 to 400 c.c.

In connection with the high voltage therapy I may state that they were preceded by x-ray treatment while the patient was still in the hospital. The current from the hospital apparatus however, was only of 125,000 voltage. Four treatments of a half hour duration were given daily.

During the later period of the deep irradiation treatment a noticeable increase in the size of the involved area became apparent. A mass at the former site of the tumor could be easily outlined with the finger. The general condition of the patient began to show the polluted state of the blood. Appetite disappeared and she was compelled to take to her bed because of the sharp lancinating pains in her hips which radiated down the inner side of her thighs to the knees. Morphine in increasing doses and at more frequent intervals had to be administered.

On April 19 a distressing diarrhea following upon a constipated condition lasting six days, greatly weakened the patient. The diarrhea lasted until April 23 (five days) and was undoubtedly of toxic origin.

On April 21 urinary difficulties began to manifest themselves. The tumor had grown to such a size as to compress the urethra and the bladder. Catheterization became necessary.

By May 2 the tumor had encroached upon the upper portion of the rectum to such an extent that a large caliber rubber tube had to be introduced to allow the escape of gas and to drain off the liquid fecal matter.

Abdominal distention at times became so severe that the advisability of an artificial anus was seriously considered. However, as long as the patient could be kept from any great suffering by the administration of opiates, this surgical measure was kept only in expectancy.

The amount of morphine up to June 2 required by the patient to assure her comfort was from 8 to 10 grains in 24 hours. There were, however, nights when the pain in her hips and extremities was so severe that 2 grains of morphine hourly for six to eight hours became necessary.

On June 27 the tumor had attained a size that caused it to protrude through the vagina, giving the appearance of a child's head partially born. The labia were edematous. The rectal mucosa extended. Through the abdominal wall the mass could be outlined immediately below the umbilicus.

The clinical picture became one of abjection. Nausea, vomiting, colicky pains, neuralgic pains in the legs, genitalia and lumbar region racked the patient's tottering structure, which required large and frequent doses of morphine to benumb its sensibilities.

A ghastly cachexia had supplanted this patient's fair complexion and showed in affrightened contrast to the clearness of her intellect.

On July 4 great difficulty in passing the catheter was experienced. This was caused by the increasing growth of the tumor. To overcome any further difficulty I introduced my hand into the rectum and forcibly ruptured the structures confining the sarcomatous mass, thereby liberating a large quantity of liver colored substance. The evacuation of this mass gave the patient great relief. She fell into a sleep from which she was awakened by an attack of vomiting. The following

two days the patient's condition grew rapidly worse. It was clearly evident that some of Nature's defenses about the malignant growth had been destroyed. The temperature which usually ranged from 99.4 to 100.2 began to register 104.5 and 105, the pulse rate increased from 100 to 120 and 130, and the long looked for relief was in sight.

On July 7 at 4 A.M. the patient asked the nurse to turn her on her right side. While being turned she was suddenly seized with a sharp pain in the left side of her chest and expired.

COMMENT

Appreciating that a deep seated cancerous growth is a most dreaded malady, hopes were entertained in this case, though not seriously as far as a cure could be expected, that some favorable impress might be made upon the malignant lesion which would result beneficently to the patient.

These hopes were engendered by the great advancement made by physicists in the development of more powerful x-ray generating apparatus and a corresponding improvement in the therapy technic both with the roentgen ray and radium.

Furthermore, confidence was heightened by reports of a rather extensive series of successful results from large clinics. In this particular case when both radium therapy and the intensive deep roentgen therapy were carried out intelligently and assiduously by skilled members of the profession, this patient's life was destroyed within the allotted time given to these cancers even before the advent of radium or the x-ray. Neither can it be said that the suffering of the patient was palliated by these treatments, as was evident by the more frequent and increased doses of morphine demanded for relief.

What in the face of such an experience can be the cogitation of one who has given credence to much that has been said regarding some of the wonderful results in cancer lesions of radium and x-ray therapy?

There is only one deduction, that radium therapy and roentgen ray therapy are at present exciting an unwarranted enthusiasm in the treatment of deep-seated cancerous growths, and that the value of this treatment in the light of our present knowledge of cancer is being overestimated.

UNIVERSITY CLUB BUILDING.

REPORT OF A CASE OF TOXEMIA OF PREGNANCY, WITH ACUTE YELLOW ATROPHY OF THE LIVER*

By Frank R. Oastler, M.D., and Harry G. Jacobi, M.D.,
New York City

(*From the Gynæcological Service and Pathological Laboratory, Lenox Hill Hospital.*)

MRS. C. B., age twenty-nine, admitted to Lenox Hill Hospital December 12, 1921. No history of jaundice or liver disturbance. One child born nine years ago, without incident. Miscarriages: the first occurred 10 years ago following the lifting of a heavy weight. Fetus of about seven weeks expelled. No curettage. No complications. The second occurred about six years ago, same cause. About four months' gestation. Expelled everything but placenta and was curetted. No complications. The third in February, 1921, same cause, four months pregnant, curetted in this hospital. Urine negative. Wassermann negative. No complications. Following curettage for second miscarriage, patient never menstruated regularly, only a drop or two of blood at intervals.

Menstruation began at thirteen years, regular, every twenty-eight days. Duration two to four days. Moderate flow. Menstrual cramps before and after menstruation. For the past six years periods irregular, very scanty and associated with severe cramps in both lower quadrants.

On admission patient complained of persistent vomiting, severe headaches, and dizziness of two weeks' duration and pain in lower abdomen, (left side), of one day's duration. For the past six weeks she had noticed that her feet were swollen and she felt generally miserable. The pain in the lower abdomen came on acutely while the patient was at rest and radiated to the back and left iliac region. At the onset the patient felt dizzy and fainted. She was carried to bed, became extremely thirsty and restless and had very little sleep that night. The next morning, ten hours prior to admission, she began to bleed from the vagina, had air hunger and extreme thirst. She had not menstruated for seven months.

On admission to the hospital patient's general condition was very bad. She was cyanotic, gasping for breath, dry furred tongue and violent headache. Temperature 105° F., pulse 120, of poor quality, respirations 28. There was no jaundice. General physical examination of heart and lungs was negative. Abdominal examination revealed considerable general soft distention with marked tenderness in left lower quadrant. Pelvic examination revealed purplish hue to external genitals; moderate bleeding from the vagina; the uterus was enlarged somewhat and soft; cervix, bilateral laceration and soft; cervical tug illicited sharp pain in region of left broad ligament. No masses were felt in the regions of the adnexa but the left side was extremely tender. Blood count showed white cells 28,000, polys 80 per cent, hemoglobin 70 per cent. Blood pressure 105/70. There was a large subcutaneous hemorrhage on the right thigh.

In view of the history of sudden onset of pain in the lower abdomen with distention and rigidity, air hunger, cyanosis and extreme thirst and the presence of marked tenderness in the L. L. Q. the tentative diagnosis of ruptured ectopic gestation was made and a laparotomy was immediately performed by my associate. The uterus was found to be enlarged and the tubes and ovaries perfectly normal.

There was nothing in the abdomen to account for the localized tenderness and distention. The abdomen was quickly closed. Gas and oxygen anesthesia.

Next day, October 13, 1921, the patient developed a very marked jaundice over the entire body. Her temperature was $101\frac{1}{2}°$, pulse imperceptible and she remained in a state of delirium which had set in immediately after the operation. Clinically her condition was more critical than the day previous and the diagnosis of toxemia of pregnancy was made. The prognosis was very grave. Blood pressure 105/70.

The attending gynecologist who had seen the patient for the first time advised that the uterus be emptied immediately.

Patient was put under gas and oxygen. Cervix dilated and the uterus emptied. Following this the uterus was irrigated with salt solution. The pathologic report confirmed the diagnosis of pregnancy.

Chemical examination of the blood on that day showed urea 50 mg., uric acid 3.3 mg., creatinin 2.05 mg., sugar 144 mg., combining power blood plasma 40 vol. CO_2. Icterus index 187.

Patient was unable to void and had to be catheterized; 125 c.c. of dark reddish urine was obtained which upon examination proved to contain blood and many epithelial cells, many hyaline and granular casts and positive bile test.

Careful examination of the eye grounds failed to reveal any pathologic condition in the fundi of the eyes. The jaundice worse. Urine passed 1200 c.c. Temperature 98° to $100\frac{1}{2}°$, pulse 110.

On the next day the patient was feeling much better. Jaundice was less marked and the patient was passing more urine and this was much less colored than previous specimens. The temperature was $100\frac{1}{2}°$, pulse 100. Patient complained of salty taste in mouth. No vomiting. Passed 1300 c.c. of urine. Slept at intervals.

Clinically there was evidence of improvement but from the laboratory findings the case was far from showing any signs of improvement. There had occurred since the last examination an increase of all the chemical elements of the blood. Of particular importance as far as the outlook of the case was concerned was the increase of the creatinin content. There were only two findings in this examination which suggested the possibility of improvement. (1) The increase of combining power blood plasma from 40 vol. to 50 vol., showing that the degree of acidosis associated with this condition indicated improvement. (2) The decrease of the icterus index from 187 to 100.

Urine examination was practically the same as on the previous examination. Amount passed 1300 c.c.

On October 16 the patient's general condition was about the same. The temperature had dropped to 100 but alternate delirium and coma were still present. The patient complained of considerable pain over the liver region and showed marked tenderness to palpation over this area. It was noted on the history chart that the jaundice was slightly more marked.

On October 18 the patient's condition as far as one could determine clinically, was improved. Patient was more rational and her temperature had remained low, $98\frac{1}{2}°$ to 100° F, pulse 120, no cyanosis. The pain and tenderness over the liver region which was noticed previously had diminished somewhat and the patient began to take some nourishment and get some sleep. Examination of the blood showed an increase in the amount of retention. A careful examination of the urine revealed the presence of leucin and tyrosin. This, together with the presence of pain and tenderness in the right hypochondrium, vomiting, delirium, drowsiness, jaundice and the marked retention revealed by the blood examination, made us feel certain that we were dealing with a case of toxemia of pregnancy, in which the amount of liver destruction was very extensive and the condition was primarily one of liver

toxemia. The extreme rarity with which recovery takes place in this condition and the fact that our patient eventually recovered and is still alive makes it still more difficult for us to establish definitely the underlying pathology in this case.

The further progress of the case is very interesting.

On October 21 the blood chemistry showed that both the urea nitrogen and the uric acid retention were greater than upon the previous examination. The creatinin value, however, had dropped from 8.25 mg. per 100 c.c. of blood to 2.5 mg., which may be considered as an almost normal value. The icterus index on this examination was 62. The interpretation of this marked decrease in the creatinin content of the blood without a corresponding decrease in the other constituents is of extreme interest and importance. It was at this point in the course of the disease that the laboratory findings gave evidence of a hopeful prognosis while clinically the outlook, though improvement was apparent, nevertheless was very much in doubt.

The general treatment consisted in the administration of large doses of alkalies by mouth and by rectum, rectal irrigations, glucose solution by Murphy drip and general sustaining medication and sedatives. When the patient was able to swallow, water was pushed to the limit. By November 7, 25 days following the operation for the removal of the fetus the patient was up, though the jaundice had not entirely disappeared. Temperature and pulse were normal and the urine still contained albumin 2 plus, but no casts, with total amount of urine 1950 c.c. for 24 hours. The blood chemistry was normal.

The case presented brings out rather forcibly the value of correlating clinical findings with those of the laboratory. It demonstrates clearly how modern laboratory methods, if used wisely, in such conditions as these, will aid both in diagnosis and prognosis.

We were indeed fortunate here to be able to follow the various changes in the chemistry of the blood during the course of so marked a toxemia, and while we fully realize that our analyses are perhaps not as extensive or as complete as might be wished for, it must be remembered that at the time this work was done we had but one aim and that was to obtain as much data as possible to aid us in the management of the condition without subjecting the patient (who was very sick) to any unnecessary manipulations.

METHODS USED

In the blood the urea nitrogen, uric acid creatinin, sugar content, icterus index, and CO_2 combining power of the blood plasma, were determined at each examination. For the urea nitrogen, the method described by Van Slyke and Cullen was employed. For the creatinin and blood sugar, we used the Meyers modification of the Folin method. The CO_2 combining power of the blood plasma was determined by the Van Slyke method, and the uric acid by the old Benedict method. To determine the amount of icterus present, we were rather fortunate in being able to make use of a method that was recently devised by our laboratory. The urine was examined from time to time to determine the presence of bile, albumin, casts, leucin and tyrosin.

TABLE I

BLOOD CHEMISTRY AND URINE CHART

DATE	UREA N.	URIC AC. MG. PER 100 C.C.	CREAT.	SUGAR	ICT. IND.	CO$_2$ COMBINING POWER	URINE	CLINICAL CONDITION
10/13	50	3.3	2.05	.144	187	40 vol %	bile - blood - alb. casts W. B. C.	Very grave
10/15	100	6.2	5.6	.120	100	50	same	Condition improved
10/18	83	7.1	8.25	.144	—	49	same also leuc. and tyr.	Condition improved
10/21	96	8.3	2.5	.126	62	59	same	Condition improved though still serious
10/25	43.5	6.0	1.35	.110	31	63	leucin and tyrosin	Marked improvement
10/31	12	1.5	1.00	.100	23	69	alb. casts, etc.	Condition improved
Normal	12-15	1-2.5	.5-2	.08-.12	3-6	53-77		

The laboratory findings here presented show strikingly that at the onset there was a retention of all the nitrogenous products. The most marked was that of the urea, then the uric acid, and finally the creatinin. In other words the urea which is the least soluble of all three began to show its increase in the blood first, while the creatinin which is the most soluble was the last to increase. It is really upon the creatinin that great stress should be laid as far as prognosis is concerned in any given case. In chronic nephritis for instance the occurrence of a high creatinin content almost invariably means a fatal outcome. In acute conditions of the type we are dealing with here, and also those encountered in the intoxications with bichloride of mercury, phosphorus, chloroform or uranium salts, a high creatinin content, while pointing to a dubious outcome, is not always fatal. In our case the sudden drop in the blood creatinin, in spite of the persistence of a high urea nitrogen and uric acid, was the important finding which pointed to a favorable outcome. One must remember also that urea, uric acid and creatinin in themselves are nontoxic. Their presence in the blood in increased amounts, indicates the presence of their more toxic antecedents.

The careful studies of Abderhalden have revealed that the blood of every pregnant female animal contains enzymes which have a specific proteolytic action and so the possibility exists that abnormal or excessive products of such proteolysis or a lack of adequate defensive digestive action may be responsible for the toxemia of pregnancy. The toxins that are usually liberated in such conditions act in a harmful way upon the liver and kidney, impairing their functions of detoxication and elimination and in this way lead to the production of a vicious cycle. When their poisons effect the liver more and the other tissues less we approach the condition of acute

yellow atrophy, e.g., if the amount of toxin is not so great as to kill the patient through injury to the vital organs, after a few days, the necrosed liver cells undergo autolysis and if enough have been destroyed hepatic insufficiency may cause death. Hence it is possible for any poisons to produce this condition under certain circumstances, whether they are the poisons of the toxemias of pregnancy, the metallic poisons, acute syphilis or any of the others. Losee and Van Slyke,[1] in their study of ten cases of eclampsia arrive at the conclusion that "toxemias of pregnancy can neither be attributed to failure of deaminization of the amino acids nor to the moderate degree of acidosis present." They also state that they have been unable to determine the nature of the toxins in such cases. In their series the highest urea nitrogen figures approximated about 26 mg. and their lowest about 10 mg. Sherwin and Killian[2] attempt to differentiate between normal pregnancy, chronic nephritis, nephritic toxemias and hepatic toxemias by the blood chemistry reporting in hepatic toxemia a high nonprotein nitrogen with low urea nitrogen and high uric acid values. C. A. Herter[3] reports his findings in six cases of eclampsia and states that he failed to find any increase in the percentage of the urea. In a subsequent paper,[4] he concluded that in cases of eclampsia without chronic nephritis the percentage of urea in the blood was almost normal or slightly increased in amount. When chronic nephritis existed, the urea was apt to be high, and when this was the case a fatal outcome was to be expected.

Farr and Williams[5] report a series of cases which are divided into two groups, A and B. The former consists of seven cases of normal pregnancy where the urea nitrogen figure ranged approximately between 7 to 15 mg. per 100 c.c. The second group consisted of three cases with renal insufficiency where the urea nitrogen ranged somewhat higher between 11 to 30 mg. per 100 c.c. They also state that Dienst now accepts the view that eclampsia and acute yellow atrophy are due to the same general causes, the chief of which is the failure of the metabolic functions of the liver. Ewing and Wolfe,[6] noting the anatomical changes in the liver and the fact that leucin and tyrosin have been reported in eclamptic urines, suggested that the amino-acids were incompletely catabolized in the degenerated liver and were the cause of the toxemia and abnormal nitrogen distribution.

As a measure of the acidosis present in our case we have determined the percentage volume of CO_2 bound in the form of the bicarbonate by the blood plasma.[7] This pointed definitely to a marked

[1]Am. Jour. Med. Sc., 1917, cliii, 94.
[2]Am. Journal Gynec. and Obst., ii, No. 1, July, 1921.
[3]Montreal Med. Jour., 1898, xxvii, 321.
[4]Johns Hopkins Hospital Report, 1900, ix, 69.
[5]Am. Jour. Med. Sc., 1914, cxlvii, 556.
[6]Am. Jour. Obst., 1906, lv, 289.
[7]Van Slyke, D. D.: Proc. Soc. Exper. Biol. and Med., April 21, 1915.

acidosis from the beginning and was the earliest to show a definite improvement in our case. In this connection it must also be remembered that Hasselbach and Gammeltoft[8] state that even in normal pregnancy a slight degree of acidosis is present as indicated by the carbon dioxide content of the alveolar air.

Another important finding in our case which requires mention is the presence of leucin and tyrosin in the urine. The finding of these constituents in the urine in a case with marked jaundice, vomiting and pain in the right hypochondriac region, have long been regarded as pathognomonic of acute yellow atrophy. The condition was first fully described by Frerichs. An interesting exception, however, has been reported by W. G. Smith[9] who found great quantities of leucin in the urine of a young woman who was apparently not at all ill. Rosenbloom[10] found tyrosin crystals in the urine of a healthy pregnant woman and cites cases of tyrosinuria without hepatic atrophy. Reiss[11] states that they are nearly constantly present in acute yellow atrophy (in thirteen out of fourteen studied), tyrosin usually being the more abundant. The earliest conception of the source of the leucin and tyrosin found in the urine was that it came from the products of tryptic digestion absorbed from the intestinal tract, which the liver could not convert into urea because of its damaged condition. On the demonstration by Jacoby[12] that these same bodies were present in the livers of phosphorus poisoned animals because of autolysis, it became probable that the leucin and tyrosin found in the urine were formed from the degenerated liver cells rather than in the intestines, which view has become generally accepted. It seems most probable, however, that the urinary amino-acids are derived partly and perhaps chiefly from the autolysis of the liver and partly from the amino-acids produced both in the intestines and within the body during tissue metabolism. The liver in its damaged condition is unable to transform these into urea, as it normally does, for several observers have reported that even relatively slight disturbances of hepatic function are accompanied by a considerable rise in the amino-acids in the urine.

In concluding we wish to state that this case is one of extreme interest: (1) Because we were fortunate in being able to study the chemical changes in the blood and urine throughout the course of so marked a toxemia. (2) Because the case presented many of the clinical and laboratory findings of acute yellow atrophy, with recovery. (3) To show the benefit of laboratory work as an aid to diagnosis and prognosis.

170 WEST FIFTY-NINTH STREET.

[8] Biochem. Ztschr., 1915, lxviii, 207.
[9] Practitioner, 1903, lxx, 155.
[10] New York Med. Jour., Sept. 19, 1914.
[11] Berl. klin. Wchnschr., 1905, xlii, 54.
[12] Ztschr., physiol. Chem., 1900, xxx, 174.

FOCAL INFECTIONS AND THEIR CLINICAL RELATIONS TO METASTASES IN THE FEMALE GENITALIA

By A. Belcham Keyes, M.D., F.A.C.S., Chicago

NO one can approach this subject without apprehension, yet in a day when, with everyone suffering from rheumatism or lumbago, our first thought is, as to the possibility of focal infection origin, the question of a primary focal infection also leading to a secondary metastatic infection of the female genitalia (nonpuerperal or puerperal) is certainly deserving of serious consideration.

Until now, to speak of, or in any way suggest the possibility of, especially the puerperal genitalia infection except "by contact," has been considered rank clinical sedition and a loop-hole for an excuse. The "almost" complete elimination of puerperal fever (in term labors) by a strict adherence to modern asepsis and antisepsis, partly confirms this opinion. Yet to consider all and every infection of the female genitalia in (a) the nonpregnant as well as (b) the pregnant and (c) the puerperal, to be so undeniably of local "contact origin" as to preclude all conservative and sane consideration of there being occasional cases that are of metastatic origin, is wrong.

One is so often confronted with secondary floating metastatic spontaneous infections in the epiphyseal ends of long, growing bones of childhood and youth and in the organs, glands and parietes after traumata in adults and indeed occasional descending infections in the nongravid female genitalia itself, that it is quite permissible to consider the occasional possibility of metastases to the "puerperal" endometric *locus minoris resistentiae.*

Before we discuss the unusual we should agree on the more usual types and sites of the female genital infections. The usual ascending female genitalia infections are:

(1) Ascending (intact mucosa) contact infection:
      (a) Noeggerath's (theory) catarrh from contact
          with the "latent" gonorrhea infected male.
      (b) Gonorrhea.
      (c) Gonorrhea-mixed (gonococcus and pus).

The "healthy" acid vaginal mucus, except when neutralized by the alkalinity of the blood, e.g., menses, polypus, fibroid, etc., is generally conceded to be too acid-antiseptic to allow ordinary pus microorganisms alone to live for more than 6 to 24 hours in the vagina. In the presence, however, of the soil prepared by Neisser's microorganism, both pus and tuberculous microorganisms flourish.

(2) Ascending (wound surface) contact infections:

      (a) Postoperative wound surface pus infections,
          e.g., after curettage.

      (b) Postabortion or post-term labor. wound sur-
          face pus infection.

The so-called puerperal infections are (a) ordinary staphylococcus, streptococcus, etc., (b) occasionally Neisserian alone or (c) both.

The longer our experience the more prone we become to feel the occult influence in even puerperal infections (especially after abortion) in which the history may throw no light of a previous gonococcus or mixed infection.

(d) In puerperal cases at term we have a wound surface which extends from the perineum to the whole endometrium via which infection can ascend by continuity from the lowest abrasion or tear, as well as by direct examination-contact.

THE SITES OF THE USUAL ASCENDING GENITALIA INFECTIONS

(1) The "intact mucosa" nongravid Neisserian infections are first endocervicitis (later secondary vaginitis). endometritis, catarrhal endosalpingitis. oophoritis. and peritonitis in turn by continuity.

While gonorrhea probably results usually in a light catarrhal condition of the tubal mucosa. yet only 6 per cent of gonorrhea cases have true pus tubes. usually with a history of gonorrhea and pus, i.e., mixed infection: most often following an abortion or in the nongravid spontaneously as the result of the careless injection, gonorrhea treatment of the male. by which the man becomes mixed infected; and mixed infects the woman.

(2) The puerperal wound ascending. contact infections are various in distribution or combination of distributions, i.e., the terminology puerperal fever is an omnibus term including:

(a) Simple saprophytic sapremia usually purely due to the retention of secundines; proved by prompt subsidence of fever on removal.

(b) True continuity puerperal endometritis gradually invades superficially as above. excepting that probably usually only those tubes changed by a previous gonorrheal catarrh. became true pus tubes and lead to invasion of the ovary and peritoneum. According to the writer's experience women who have never had gonorrhea pass through the severest puerperal sepsis oftentimes and still bear many children.

(c) Contiguity puerperal infection from the endocervix or endometrium may develop deep via the lymph spaces in the cervix or metrium and parametrium.

The looser parametrium after abortion and especially after term

labor, is frequently invaded by infection with the formation of para-
metric phlegmon.

(d) Puerperal endothrombophlebitis (especially at the placental
site) with possible phlegmasia alba dolens, pulmonary embolism, sim-
ple infarct, or even sudden death or lung abscess or empyema. In one
woman with many decayed teeth, milk leg followed spontaneous term
labor in which none but rectal examinations had been made by the
writer.

(e) True puerperal septicopyemia.

(f) Any combination of the above.

DESCENDING FEMALE GENITALIA INFECTION

Until we have more data on this subject we are forced to theorize
as to modes of metastasis, yet our experiences with other infections
make it very possible to imagine metastases as a cause of female
genitalia infection.

(a) Descending continuity nongravid female genitalia infections oc-
casionally are met with, e.g., colon bacilli pus tubes.

The infection in these cases probably gained access first to the peri-
toneal surface a co-existing or previous cholecystitis, enteritis, ap-
pendicitis or colitis.

The migration to the tubes and ovaries or both is possibly via the
so-called Menge's peritoneal wave, normally supposed to guide the
ovum to the tubes.

In descending pus tubes as in the ascending the changes from a
previous gonorrhea very probably renders the tube more liable to de-
scending infection.

The ovulations atrium also invites the lodgment of infection in the
ovary undoubtedly to a certain degree.

(b) Adhesions, e.g., between appendix or intestines and any part
of the genitalia are common. The inflammations that incite adhesion
formation may be primarily intestinal, or primarily salpingitic, or
the primarily changed surface of a torsioned ovarian tumor, with sec-
ondary infection from the intestine.

(c) Descending continuity puerperal infection when the whole of
the endometrium is a wound surface (*a locus minoris resistentiae*) de-
serves according to the foregoing, consideration as a possibility especially
via the tubes if they have the before-mentioned increased "gonorrheal
vulnerability" to invite descending infection. Dr. Richard Bartlett Ole-
son and Dr. McGrew when internes in Cook County Hospital, had a
primipara unexpectedly fall in precipitate labor. No vaginal exami-
nations were made so far as known. The patient had been in hospital
over two months. A lethal puerperal peritonitis developed. The
autopsy revealed a ruptured pus tube and the abdomen full of pus.

The uterus was still normal and free from implication, macroscopically.

Maximillian Herzog (the pathologist) in a lethal case of puerperal infection in a young primipara, could find only colon bacilli in the cultures from the uterus. There had been no vaginal examinations, the labor was precipitate. The obstetrician was a man of the best skill and highest integrity.

(d) Descending puerperal infection to the paratissues.

This paratissue is one loose connective tissue extending from the loose paranephrium posteriorly around the kidney down to the paraproctium and upwards and forwards as the parametrium and anteriorly as the paracystium and cavum of Retzius to the preperitoneum.

To speak of metastases from above downward via the paratissues is somewhat paradoxical as (a) metastases by the lymph and venous blood vessels in these tissues occur upwards; yet (b) by gravity and size, pus may ''sink'' downwards in this loose tissue and the infection often is erroneously attributed to the organ nearest the place of pointing.

Any retroperitoneal infection from a retroperitoneal appendix or retroperitoneal intestines, (ascending colon or rectum) from colon bacilli or swallowed pus gaining access to the paratissues and becoming large in size (phlegmon) may easily travel (sink) downwards in the paratissues (especially if subacute or chronic) to the parametrium and be diagnosed as primary parametritis and during the puerperium be naturally considered of puerperal origin.

The writer has seen paratissue phlegmon follow a hemorrhoid operation and also the pointing on the anterior surface of the upper third of thigh of a primary paraappendiceal abscess in a patient aged forty-two. Gas generating colon bacilli are very prone to dissect widely.

The literature no doubt contains many reports of supposedly parametritic abscesses that were probably primarily paranephritic, paraappendiceal or paraproctial in origin.

In passing it is also of interest to recall that the early idea of puerperal parametritis was that it was a (sinking) Pott's disease, and women were almost frightened out of childbearing, because of this supposedly common pregnancy-accompanying, vertebral, tuberculous danger in the preantiseptic days, till Duncan and Virchow gave the true puerperal etiology of primary puerperal parametritis from ''contiguity puerperal infection''. via the endocervical lymphatics which pass directly through the cervix or in term cases the tears of the cervix may open directly into these paraspaces.

(e) Descending lymphatic and blood vessel metastatic infections to the puerperal genitalia are undoubtedly as possible as to any other

place of lessened resistance, even if clinically considered rare. Surgeons of experience well know that as the glands are the filter for the lymphatics; so the lungs are the filter for (both descending as well as ascending) venous infections. Arteries are not feared so much in these days of asepsis but we are in deadly fear of infection of veins, thrombosis and either pulmonary or transpulmonary embolism of distant organs.

Primary lymphatic descent of "focal" infections can easily occur via the lymph glands to the subclavian veins, then through the right heart to the lungs and pulmonary infarct, etc., or through the lungs to the left heart and systemic infarct of any distant organ. The finer the lymphatic metastases are, the more prone theoretically are they to pass through the pulmonary filter.

In the teeth as in the unyielding bone in osteomyelitis, the infection may, as it were, be forced into the veins, causing thrombosis, with the possibility of embolism.

The lung symptoms from such emboli, e.g., lung infarct, or abscess, with pleurisy or empyema if during the puerperium may easily be erroneously considered as secondary to the pelvic condition and their "focal origin" be overlooked.

Lastly, free bacteriemia with metastasis in the puerperal endometrium wound surface is a possible occurrence secondary to focal infections.

That so large a puerperal wound surface under proper antiseptic precautions of delivery usually runs a normal course, is probably due to the greater resistance to infection by antibodies in the whole body generally and especially so in the puerperal (uterus) wounds and looser puerperal parametrium and adnexae after term labor. The uterine contractions at a healthy maximum, present an endometric surface that is relatively bloodless, superficially.

This peculiar increased resistance of the physiologic wound surface of the term uterus is demonstrated by the often milder course and superficiality noted in some very virulent streptococcus endometric infections after term labor compared to like infections after abortion, which latter notwithstanding our improved technic still are a source of great anxiety even in the absence of criminal induction or contact examinations.

That a local difference in resistance in different parts of the body does occur, is also often evidenced clinically in other parts of the body by, e.g., an infection extending from the hand to the elbow for three months without invading any other portion of limbs or body that was completely healed in one week after the injection of vaccines.

That certain normal tissues also differ in resistance to infection is evidenced by the very infrequency of metastatic abscess in adult bone

via the blood stream, both when intact and also in cases of a point of lessened resistance, e.g., in simple fractures.

The deduction is that the female genitalia, despite the fact of their apparently easy accessibility to focal infection metastases are but rarely implicated "descendingly," either in the nonpregnant and but *very* rarely after term labor, when pus from suppurating teeth, tonsils, etc., would have the best chance to undergo metastases to the places of (theoretical) lesser resistance via the looser puerperal paratissues or by the peritoneal fallopian tube (Menge's wave) route to the endometric puerperal wound surface or as floating bacteria by the blood route. Yet the possibility in rare instances must be admitted. The placing of all of the responsibility for puerperal sepsis at the door of the attending physician is undoubtedly as unjust as it would be to place none. Because a woman is pregnant or in labor or in the puerperium, it does not necessarily exempt her from all the forms of metastatic sepsis to which flesh is heir.

Lastly, in the occasional nonpregnant infected case in which neither history nor proof of a previous ascending gonorrheal infection, nor the history of a recent abortion can be obtained, it would appear as though we occasionally had an atypic metastatic infection, e.g., ovarian abscess from floating bacteria or descending infection by one of the routes mentioned above.

The proof of puerperal infection of focal origin would be in finding the same kind of pus in. e.g., the teeth and the pelvic infection and then proving it to be positively a descending and positively not an ascending infection, which latter could, however, easily occur by the contamination of the patient's fingers from the mouth to the vagina.

Despite the deductions which speak for the rarity of the focal infection causing puerperal infection, examination and if necessary, treatment of the head mucosa and bronchi should precede every operation, and also be done in early pregnancy, as should especially the teeth be cared for by a reputable, conservative dentist, as pus anywhere in the body of a pregnant woman is a menace to the kidneys even if not generally from a puerperal wound standpoint.

1421 PEOPLES GAS BUILDING.

A NEW MEASUREMENT AS AN AID IN DIAGNOSIS OF RACHITIC AND GENERALLY CONTRACTED PELVES

By Walter E. Welz, M.D., F.A.C.S., and Russell W. Alles, M.D., Detroit, Mich.

IN THE prenatal clinic of the Detroit Department of Health the attendance is almost equally divided between whites and negroes, and every pelvis is measured, as a routine, both externally and internally.

While engaged in measuring these negro pelves, a marked discrepancy was noticed between the external measurements and what one would expect to find on internal examination. According to the standards set for external diameters in obstetrical textbooks, one would conclude that very many negro pelves were markedly contracted if measured only externally. On internal examination and mensuration of these same pelves, however, one usually finds an unexpectedly roomy canal. This fact has previously been observed by T. F. Riggs,[1] who made it the subject of an original paper.

With the purpose of determining the exact differences between the negro and white pelves, we began to measure every negro pelvis in every diameter which could be accurately measured, and which we considered of value.

While preparing for the beginning of this work and compiling the available measurements in the living, it was found that Breus and Kolisko[2] gave the height of the pelvis (Höhe der Seitenbeckenknochen) in their studies of pelves, and it occurred to us that while the studies of Breus and Kolisko referred particularly to dry pelves, this measurement should be determined fairly accurately in the living although we have not been able to find any reference to it despite a fairly comprehensive search of the literature on the subject.

We determined to use this measurement and the ease with which we were able to calculate it has seemingly justified its use. Also, the information gained thereby seems to us to be of no little importance.

The method of determining this measurement is very simple, requiring only the use of an ordinary pelvimeter. The patient is placed on either side, preferably the right, in the exaggerated Sims position. The left leg is flexed about 120° with the body, and the patient instructed to relax all of the muscles of the leg. The tuberum ischii is then easily palpable and the one point of the pelvimeter is placed firmly upon it, being held by the left hand of the operator. The fingers of the right hand then seek the highest point of the crest of the ilium

which furnishes the other point for the measurement. The tips of the pelvimeter are then depressed to bring them as closely as possible to the bony landmarks, and the reading taken. One centimeter is deducted from this reading to allow for the thickness of overlying tissue.

Up to the present time we have measured 240 pelves, 200 of which we have determined to be normal. These cases have not been selected, but represent all patients attending the clinic, who, as nearly as could be determined, were full-blooded negroes, and we have disregarded only such patients as were too obese to be very accurately measured.

In the course of these measurements we have found that, in certain types of contracted pelves, this measurement is very materially shortened, in fact, to such a degree as to be almost diagnostic of contraction. The average height of the pelvis in our 200 normal cases has been 20.89 cm., almost within 1 mm. of 21 cm. The lowest measurement which we have obtained in our normal cases, has been 19.5 cm., which was found in but three instances.

We have met with 18 rachitic and seven generally contracted nonrachitic pelves, and in each of these groups the average pelvic height has been 19 cm. In the rachitic group, one pelvis measured 21 cm. in height.

TYPE OF PELVIS	NO. EXAMINED	AVERAGE HEIGHT OF PELVIS
Normal	200	20.89 cm.
Rachitic	18	19 cm.
Generally Contracted	7	19 cm.

COMMENT

In view of the numerous proofs which have been offered regarding the lack of dependability of the conjugata externa (of Baudeloque), and our own experience, we believe that the measurement of the pelvic height is not only more easily determined but also is consistently of greater interpretative value than the measurement of the conjugata externa (of Baudeloque). It requires no particular skill to be determined exactly and, when it is found to be 20 cm. or below, a thorough internal examination of the pelvis is indicated. In view of the ease with which the measurement is taken and the apparent value in diagnosing certain types of pelvic contraction, we recommend it for the use of every one who practices obstetrics.

In our series of 25 rachitic and generally contracted pelves, there were but two instances in which the pelvic height was above 19.5 cm. One of these is mentioned above, and the other measured 20 cm. Outlet contractions and funnel pelves show no definite alteration in this diameter.

We thoroughly realize that our series of cases is entirely inadequate to either prove or disprove any assertion but we are reporting our

findings in the hope that others who have a large material will take up the procedure here outlined in order to establish the value of this measurement in these types of contracted pelves.

REFERENCES

(1) *Riggs, T. F.:* Johns Hopkins Hosp. Repts., 1904, xii, 421-454.   (2) *Breus and Kolisko:* Die Pathologischen Beckenformen, 1904, i, 455, 650.

MENSTRUATION—AN INQUIRY INTO ITS ETIOLOGY

By Isidor Kross, M.D., New York, N. Y.

(From the Gynecological Department of the Mt. Sinai Hospital, Dr. Joseph Brettauer, Director.)

WHILE much light has been cast upon various problems in the physiology of the generative organs, the factors involved in menstruation still constitute an unfinished chapter. It is not my intention to enter into any lengthy or detailed review of this subject in this preliminary report, but simply to call attention to a few relevant facts.

At the present time, Fraenkel's[1] theory, that the corpus luteum is the responsible factor in the causation of menstruation, is the one that is generally accepted. This author claims to have proved that removal of the corpus luteum is followed by a postponing of the next menstrual period, and that only when a new corpus luteum has been formed, does menstruation appear. In discussing these claims, Halban[2] states that (1) in four of the nine cases cited by Fraenkel, it was a graafian follicle and not a corpus luteum that was removed, (2) in a fifth case no effect upon the menses was produced, in three others there was noted a bloody flow several days after the operation and in the last a similar condition was noted fourteen days after operation. These experiments certainly do not allow definite and clear cut conclusions to be drawn from them.

Halban (loc. cit.), who is the strongest opponent of the corpus luteum theory, studied forty cases in which the corpus luteum had been excised in toto and found that a normal menstrual flow appeared two to four days after operation in thirty-seven (92½ per cent) of these cases. Of the other three instances, one concerned a patient forty-nine years old who was already irregular in her menses prior to the operation and who had had no menses when last seen several months later. She presumably had reached the climacteric. The other two patients had microcystic degeneration of the ovaries and menstruation did not appear until eight weeks later.

In the thirty-seven cases, however, there is a clear-cut and definite

clinical picture. Removal of the corpus luteum was always followed in from two to four days by a normal menstrual period with subsequent menstrual periods at the usual intervals. This phenomenon occurred regularly irrespective of the period of time that had elapsed since the last menstrual bleeding. The picture presented in these experiments is a clear-cut and definite one showing the relationship between cause and effect.

Against the theory that it is the corpus luteum that is responsible for menstruation, I wish to cite briefly two very instructive cases that have recently been studied in the Gynecological Department of the Mount Sinai Hospital. The first one has been recently included in a publication by S. H. Geist[3] in elaboration of his theory on the relationship of microcystic disease of the ovary to functional uterine bleeding.

Mrs. N. B., No. 213838, twenty-eight years old, admitted Oct. 1, 1921. Her family and past history have no bearing upon her present illness. Menstruation began at 12 years and was irregular with intervals of five to eight weeks. The periods lasted from five to twelve days and were very profuse. During eleven years of married life she had given birth to five children, the last one two years before admission to the hospital. One and a half years ago, following a period of amenorrhea of six months, the patient began to bleed. After two months of continuous bleeding, she was curetted. There followed a period of amenorrhea of seven months, succeeded by continuous bleeding lasting three months. This was followed by a period of amenorrhea of five months and menorrhagia four months. She was then admitted to the hospital.

Physical examination, except for a moderate cysto-rectocele and a slightly lacerated cervix, was negative. A hysterectomy and bilateral salpingo-oophorectomy were performed. The uterus was normal in size and the endometrium hyperplastic and edematous. The ovaries were enlarged to twice their normal size, and had a thickened tunica albuginea. Sections showed the entire circumference of the ovaries to be studded with small cysts two to five millimeters in diameter. Histologic examination of the uterine mucosa showed the hyperplasia that is usually found in functional bleeding of endocrine origin as described by S. H. Geist.[4] The stroma was edematous and its cells swollen. The glands were tortuous, elongated, and cystic. The ovaries showed thickened tunica albuginea and numerous cystic atresic follicles none of which contained ova. The stroma proper was condensed and fibrotic. The medullary portion contained several embryonal rests. Careful examination failed to reveal any corpora lutea.

The second patient, E. F., was admitted April 24, 1922. Her family and past history were negative. Menstruation began at thirteen years, appeared regularly every four weeks, lasted from five to six days, and was very profuse. During the past two years, her menses have appeared every two to three weeks and the flow has become much more profuse. Physical examination revealed a uterus that was slightly enlarged and a left cystic ovary about the size of a plum. On April 28, 1922, a left salpingo-oophorectomy and a partial resection of the other ovary were performed. The pathologico-anatomical findings in the ovaries in this case were similar to those of the first patient. Here too, no corpora lutea could be found.

E. H. Ochsner[5] showed that, not only does a persistent corpus luteum inhibit ovulation, but that it even inhibits menstruation, and

that the removal or destruction of the persistent corpus luteum removes the inhibition and allows menstruation to occur.* During the past year, I have had under observation three patients whose clinical history very strikingly presents this same phenomenon. In these patients there have occurred repeatedly delays in menstruation, accompanied by nausea, vomiting, and a feeling of heaviness in the pelvis. Pelvic examination showed enlargement and softening of the uterus, thus simulating very closely an early pregnancy. In one of these cases, a distinct enlargement of the ovary could be made out. This enlargement always disappeared after the onset of the menstrual flow.

It is now generally acknowledged that pregnancy cannot occur without the presence of a corpus luteum, and it is also known that pregnancy can occur before the onset of the first menstrual period and during a period of amenorrhea, i.e., during lactation. In both of these instances, ovulation and corpus luteum formation have occurred while menstruation has not. This is especially to be considered in view of the two cases cited above, in which there was profuse bleeding in the absence of corpora lutea.

I believe that one is justified in stating that clinical and experimental evidence is directly opposed to the theory that the corpus luteum is the causative factor in menstruation, and that it points clearly and definitely to the mature graafian follicle as the responsible factor in this process.

REFERENCES

(1) *Fraenkel, L.:* Arch. f. Gynäk., 1903, lxviii, 438; ibid., 1910, xci, 705. (2) *Halban, J.:* Arch. f. Gynäk., 1914, ciii, 575. (3) *Geist, S. H.:* Jour. Am. Med. Assn., lxxviii, 1185. (4) *Geist, S. H.:* Surg., Gynec. and Obst., 1916, p. 68. (5) *Ochsner, E. H.:* Surg., Gynec. and Obst., 1920, xxxi, 496. (6) *Mackenzie, W. R.:* Brit. Med. Jour., March 4, 1922, p. 343.

20 WEST FIFTIETH STREET.

*Mackenzie[6] has recently reported a series of cases quite similar to those of Ochsner.

THE IDENTIFICATION OF BABIES IN MATERNITIES

By Jos. B. De Lee, M.D., Chicago, Ill.

MATERNITY hospitals, and maternity wards in general hospitals, are increasing in numbers and in size, and it will not be long before the majority of children will be born in institutions. While this is very desirable from many points of view, there are several drawbacks. Some of these objections may be removed by proper care. One of these is the danger of mixing the babies. The writer, therefore, would issue a word of warning in the matter of identification of the newborn infant.

From experience in many hospitals both in and out of Chicago, the conclusion is inevitable that the usual methods employed are not adequate. The writer is personally acquainted with several instances where only the greatest efforts of the whole hospital personnel, aided by fortuitous circumstances, enabled exact identification of the infant to be made.

Only those who have lived through the experience of mixing the babies, can realize the calamity such an accident produces. In all human experience, doubt is the easiest feeling to arouse and the hardest to allay. Even after the doctors, the nurses and all impartial observers have been convinced that the parents are really taking home their own child, and the excitement in the hospital has subsided, the family will always harbor a faint spectral doubt which will come to expression in after years if the child should not show a resemblance to either parent or should exhibit traits which are not harmonious with the desires of the family.

In a small maternity service the chances of mixing the babies are few, but none-the-less real. In a large service they are very many and very real.

Mixing of the babies can occur immediately after birth (most common) and at any time within the first week of life—or until the mother learns to recognize her own infant. The identification, therefore, must be perfect at birth, the marks must be accessible during the child's stay in the hospital and there must be means of proving the identity for a reasonable time after the baby goes home, should a late doubt arise.

The following methods of labelling the babies are in vogue:

1. Adhesive plaster fastened to various parts of the infant's person, bearing its name.

2. A tape attached to the child's wrist bearing a number which corresponds to a number on a similar tape around the mother's wrist.

3. A metal check with either a number or the name of the infant scratched upon it and tied or sewed around the neck or the wrist.

4. A beaded necklace with lettered beads spelling the child's name.

5. A silver bracelet with the child's name engraved on it.

6 The child's footprints (and sometimes thumbprints) recorded on the history sheet and on a slip supplied the parents.

The writer has tried two other methods:

1. Tying a slip of sterilized paper on the navel when the cord is severed, the paper having the child's name on it.

2. Writing the name on the child's chest with indelible pencil.

Among other methods are, attaching the identification tag to the child's dress or its crib, the use of a locket with chain around the neck.

Not one of these procedures, used alone, is without the possibility of error.

Not one of them is sufficient protection against human error, or ignorance, or incompetency, or thoughtlessness, not to mention downright carelessness. Accident also plays a part in the confusion, and must be reckoned with. It is amazing what combinations of circumstances can arise which may render the technic of identification of the children default.

Actual experience has convinced me that at least three different and interlocking safeguards are necessary.

The method employed at the Chicago Lying-in Hospital is the outgrowth of this experience and the writer holds that, no matter how fast the babies come, and in whatever numbers, no matter how excited and rushed the interns and nurses get, no matter how often the babies are transposed in the nurseries, or on different floors, each mother goes home with her own flesh and blood in her arms.

THE CHICAGO LYING-IN HOSPITAL METHOD

In the first place the matter of identification of the babies is made one of supreme interest, and the doctors and nurses are constantly reminded of it and impressed with its importance. The technic of the method is interwoven with the aseptic technic of the birthroom so that should a doubtful identity have to be traced back, the same course is traveled as in tracing an error of asepsis or a lost sponge, and each individual who had anything to do with the case, can be questioned. Further, by means of cross references, the steps of the identification process can be correlated and an error at once discovered.

1. Each "Labor Drum", (containing the towels, sheets, sponges, umbilical tape, etc.) is given a number, stamped on an aluminum tag. In each drum with the umbilical tie, are two pieces of tape, each with the same number written with ink, one intended for the baby's wrist, its duplicate for the mother's wrist. The aluminum tags are numbered 1 to 400. There are no duplicates. They are used in succession and by the time the series is begun again the babies of the first numbers have long since left the hospital.

2. Attached to the crib, waiting for the reception of the newborn babe, is a piece of adhesive stamped to receive the name of the baby, number, sex, date of birth, and the doctor's name.

3. In each Birthroom is a footprint taking outfit.

When the Labor Drum is opened for the delivery, its number is entered in the Time Book, together with the name of the nurse who assists at the delivery, and who is responsible for the identification of the baby, for the asepsis, and for the sponge count. The patient's, the doctor's, the intern's, names are recorded in this book, also chronologic items of the labor, etc.

As soon as the child is born, *before the cord is cut,* the tape bearing the drum number is tied around the infant's wrist, and the duplicate handed to another nurse or the anesthetist who immediately ties it around the mother's wrist, and *at the time, each one making the tying, announces, in a loud voice, the number.* The doctor repeats this number, if they correspond, and the nurse who keeps the "Time Book" compares it with the drum number previously entered upon her record of the events of the labor. This is the keystone of our arch of protection and the greatest emphasis is placed upon it.

After the child has been laid in its crib, another nurse wipes its back clean, and carefully affixes the aforementioned adhesive plaster on which have been written the child's name, the date of delivery, etc. and the wrist number is carefully verified. Only after these two functions have been completed may the infant be removed to be weighed. The wrist number tape is now sewed on the wrist snugly and securely.

Next, the child's footprints are taken. Two impressions are made of each foot, —one upon the mother's history sheet, where it is a permanent record, and one upon a slip of pink paper. The nurse verifies the name on the history sheet as that of the mother of the child, also the wrist number and enters them upon the pink slip. The latter is given to the mother for control. She usually preserves it by framing, or puts it in the "Baby Book." This sheet contains the name of the baby, that of the doctor, the date, sex, weight, and the wrist number. For a time we also made a record of the thumbprints of the mother, but found this super-fluous and time-consuming, and gave it up. There are, however, advantages in the practice, and we will resume it when the shortage of nurses is relieved.

After the child is sent to the nursery, its crib card is filled out. A baby appearing in the nursery without all its identification marks in good order, is returned at once to the birthroom. The crib card has the child's name, the doctor's name, the room number, the date of birth, and the *wrist number*. This card keeps the baby's individuality in the nursery.

When the mother and child leave the hospital, the wrist tapes are compared with the number on the adhesive plaster, then removed and presented to her, but the adhesive plaster is not removed. This the mother is instructed to take off *after* she arrives at home and not before.

A child may not be discharged unless all its identification marks are proved to be in perfect order. Should any doubt arise,—a very rare occurrence, the baby's footprints are taken and then everything is checked back to the drum number. Every vestige of doubt is thus easily dissipated.

This system has been in vogue in the Chicago Lying-in Hospital for the last nine years. It is, indeed, somewhat cumbersome, but experience under actual and, to the uninstructed, inconceivable, conditions has proved that it is accident-proof, ignorance-proof, and carelessness-proof. It is of great comfort to the Hospital administration and gives abiding confidence and perfect satisfaction to the parents of the child.

426 East Fifty-first Street.

Society Transactions

TRANSACTIONS OF THE AMERICAN ASSOCIATION OF
OBSTETRICIANS, GYNECOLOGISTS AND
ABDOMINAL SURGEONS

THIRTY-FIFTH ANNUAL MEETING

ALBANY, NEW YORK, SEPTEMBER 19-21, 1922.

(Continued from February issue.)

Dr. Paul T. Harper, Albany, N. Y., presented a paper entitled **Clinical Aspects of Blood-Loss in Labor.** (For original article see page 233.)

DISCUSSION

DR. GRANDISON D. ROYSTON, St. Louis, Missouri.—I think the remarks of Dr. Harper are well taken in regard to conserving the patient's energy during labor. We too, attempt to conserve the strength of our patients during labor. Since Dr. Polak's paper on the management of the third stage of labor appeared in 1915, I have insisted upon every class memorizing that paper as near as they could, telling the students that it would be one of the final examination questions. Dr. Polak has said that spontaneous detachment of the placenta is one of the most important factors in preventing postpartum hemorrhage. Since following his method of placental stage management, I have seen but one hemorrhage that caused trouble. This patient was a gravida II, a rather anemic individual, who was delivered within ten minutes after reaching the hospital. There was no bleeding from the time of the delivery until the placenta was spontaneously expressed, ten minutes after delivery. That goes hand in hand with previous observations, and, I have never seen a woman have an alarming postpartum hemorrhage who had not had a short third stage.

DR. JOHN OSBORN POLAK, Brooklyn, New York.—Dr. Harper has brought out the point that postpartum hemorrhage, particularly when occurring at the placental site, depends wholly on the retractility of the uterus. The actual blood lost in a thousand cases, from the moment the baby was delivered until the uterus had retracted and contracted and all bleeding had ceased and the uterus was firm, was less than 250 c.c.; some of them had as little as 30 c.c., some as little as 100 c.c. We had three cases in which the blood loss exceeded 600 c.c. All these cases were treated on the same plan that Dr. Royston has spoken of, and that is leaving the uterus to take care of itself, allowing physiologic separation and expulsion. Immediately upon expulsion of the placenta the patient receives an ampule of putuitrin. One of the important points is that the uterus shall not become tired before delivery. Why should we carry the second stage over three and four hours when the woman is not doing anything but using up her strength and lowering that muscular tone which cannot be regenerated?

Another thing that comes out prominently in these cases of blood loss is that the uterus will contract and retract if for a moment the blood supply of the uterus is shut off; in other words, a bleeding uterus or relaxed uterus is constantly losing

strength by every drop of blood that is lost, and if we can shut that off by compression of the abdominal aorta, the blood supply to the uterus, it is amazing to see how quickly a tired uterus will come together and retract. In the third stage, the uterus goes through the physiologic acts of separation, expulsion and retraction, just as it has affected dilatation of the cervix, and conservation of the muscular tone during labor, assures retraction when the uterus is empty.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—I am glad to hear the results of Polak's investigations in regard to the amount of blood lost after the birth of the baby, because a few years ago, Williams, of Baltimore, published investigations made at the Johns Hopkins Hospital in which he found that it was common for a woman to lose 500 c.c. of blood after the birth of the child. Quite a number of women lost 1000 c.c., and some as much as 1500 c.c. without giving symptoms of postpartum hemorrhage. Polak's figures are one-half the figures given by Williams as the lowest, and they are important for the reason that they give us some clue as to what can be called normal blood loss in a woman. It would be unreasonable to suppose that a woman could lose from one to three pints of blood in a normal labor without showing considerable distress.

Another point in Nature's method of checking hemorrhage was not mentioned by the essayist, that namely, the blood vessels of the placenta are elastic, and when in consequence of the contraction of the uterus the sinuses are torn through they retract into the muscle bundle, and the muscles being arranged in the form of a figure of eight, contract down upon them and ligate them in that way.

I think a very important thing in the prevention of postpartum hemorrhage is to stop instructing our trained nurses, as soon as a baby is delivered to put their hands on the uterus and manipulate it. That is followed in our city to a great extent, and I believe the trained nurses hereafter should be taught to let the uterus entirely alone after the birth of the child and leave it to the physician to watch for any sudden dilatation and hemorrhage from relaxation.

DR. B. R. McCLELLAN, XENIA, OHIO, presented a paper on **Retrodisplacements of the Uterus and Pregnancy.** (For original article see page 242.)

DISCUSSION

DR. HERMAN E. HAYD, BUFFALO, NEW YORK.—The subject which the doctor has presented this morning is as fecund as it was fifteen years ago when I wrote a number of papers on retroversion of the uterus and which led, as you may remember, to a very active and acrimonious discussion as to the methods which were to be employed in their treatment.

The abstract of the doctor's paper as given in the program reads, "are displacements of the uterus responsible for sterility?" Yes, but there must be some other elements than the mere mechanical difficulties and they certainly come later from obstruction to drainage. Therefore, we must realize that every displaced uterus may sooner or later be associated with a catarrhal endometritis or a catarrhal salpingitis which will, of course, increase the acidity of the vaginal secretions and necessarily interfere with fecundation. I am satisfied that there does exist a class of retrodisplaced uteri that do not produce symptoms, although I am equally satisfied that sooner or later many of these uteri will produce symptoms, and when they do so, they should be operated upon, as I think a pessary is only useful in recently retroverted or retroflexed uteri. A uterus that has recently fallen after a miscarriage or after labor should be treated with a pessary, and if the woman wears the pessary for a few months and it is found, when it is taken out, that the uterus has fallen back, we should consider the case a surgical one and operate.

The doctor has spoken of and seems to endorse strongly the Gilliam operation. I am going to make a plea for the Alexander operation in uncomplicated cases of retroversion of the uterus; I mean cases where there is no recognizable tubal or ovarian trouble and the uterus is movable and yet producing symptoms. I have done a good many Alexander operations and I have succeeded in having women bear one, two and three children after this operation; they are grandmothers now and their daughters I have operated upon for retroversion. I have seen in one family three women upon whom I have done the Alexander operation, wherein the uterus stood the test of pregnancy, where it remained in position, and where the women were relieved of their symptoms and of all possible late intraperitoneal complications which were the result of operations, which open the abdominal cavity. However, when we have a different class of cases to deal with, where the tubes and the ovaries are involved, then we must employ an abdominal method as these are not uncomplicated cases of retrodisplaced uteri. Perhaps, once in a while, we may make a mistake in diagnosis in a case where some slight adhesion may exist, or probably a tube may be thickened and closed, but after all, these mistakes should be rare. Unfortunately it is claimed that all symptoms producing retrodisplacements necessarily have tubal and ovarian pathology or there is present chronic appendicitis or some other intraabdominal trouble, so the abdominal operation is done, not alone for the retroposition, but to explore the abdomen. It is so much easier to do this, than it is to do an Alexander operation. I have done many Gilliam operations; I have done quite a number of Webster-Baldy operations, and I have made up my mind after twenty-five years of experience, and you will not change the result of that experience by your discussions today, and I shall continue to do the simple looping, reduplication of the round ligaments operation such as Mann described years ago, as it holds the uterus up and causes fewer adhesions and subsequent complications. I do not care particularly what operation you do on the round ligament as long as you reduplicate it sufficiently and sew it together with linen, being careful not to take too much of the ligaments or tie the sutures too tight, so that the ligament atrophies and shrivels up. If there is a heavy uterus, tuck it up to the abdominal wall with a fine catgut, to hold it in place for a few days, and sometimes, if the uterus be large and heavy and the broad ligaments sag, then you can shorten the uterosacral ligaments by putting a couple of stitches through them. I think with this simple technic you can place the uterus permanently where it belongs and you leave the ligaments in position to pull the uterus in the direction which nature originally intended. If the ovary has fallen into the culdesac, shorten its ligament with a couple of fine linen sutures and thus hold it in place.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I should like to endorse the excellent paper that has been presented, as well as the remarks of the last speaker. When we come to consider the question of sterility in women, the essayist only considered one-half of the problem. When a woman comes to you and says that she is sterile, that she has been married five or six years, and wants to have a baby, a very important and interesting problem presents itself to you. You examine the woman and are not quite certain that there is pathology enough present to justify the sterility. Examination may simply show a retroverted uterus which may be the cause of her sterility.

I want to present the other side of the picture. A case came under my observation a few days ago. The husband was thirty-eight years of age, had been married seven years, but they had had no children. The wife was examined by six different men. She had had three curettements and was promised that she would be well. She had worn a pessary which seemingly corrected the retroversion, but still she did not become pregnant. After obtaining this history I said, "Very well, madam, go into the adjoining room," and after she went into the room I turned to

the husband and said, "When did you have gonorrhea?" He replied, "I have not had that since I was married; I had it before." I sent him to a specialist who found that he was absolutely sterile. I did not do anything for his wife.

DR. WILLIAM PFEIFFER, BROOKLYN, NEW YORK.—The remarks made by the last speaker concern one of the points I want to bring out. We feel that no operation should be undertaken until two things have been done. We should not operate on the female genitalia for sterility until the male partner is first examined. And the second point is, are the tubes patent?

DR. HUGO O. PANTZER, INDIANAPOLIS, INDIANA.—A patient confined in the last week came to me after having been married six years. I found she had a retro- and right lateral retroflexion of the uterus. I found associated with that ileocecal torsion and a very much shortened ileotendinous band coming down from the ileocecal junction to the ovary. I cut the ileotendinous band, lengthened it and she subsequently had a baby.

DR. JOHN OSBORN POLAK, BROOKLYN, NEW YORK.—There is one point I want to bring out in regard to the doctor's paper, most of which we all endorse, and that is, there is a very great difference in the action of spermatozoa that you examine under the microscope and those examined *in situ*. For the last five years we have been examining these cases after intercourse to determine the condition of the spermatozoa. Many of these retroversions that were formerly operated on have surprised us. Many of these anteflexions on which we have done operations on the cervix have surprised us by our finding living straight tail spermatozoa well within the cervical canal; consequently, it seems to me, that in any discussion of this sort, not only the anatomical factors on the part of the woman but the potency of the man as the doctor brought out should be investigated, particularly the potency of that man with that particular woman.

Another interesting thing is that there is something more important in the man than even the production of spermatozoa, because women in whom we have demonstrated patent tubes and the presence of spermatozoa inside the cervical canal, and who at operation had apparently healthy ovaries, have not conceived, and yet those same men have married other women and pregnancy has followed. Consequently there must be something in the claim made by genitourinary surgeons, that the stimulation of the sexual act and the consistency of the semen have something to do with the question of sterility. I do not believe we should go on record—and we have all seen certain cases of retroversion of the uterus after correction become pregnant—that that operation or any operation of itself has produced this or that particular pregnancy. There may be something in the stimulation at the time of copulation that does not occur at another time.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—There is another feature to consider in connection with these cases, and that is, with a uterus in the normal position we have healthy arterial circulation, whereas in retroversion we have a passive venous congestion which interferes with normal function.

DR. JAMES A. HARRAR, NEW YORK, N. Y., presented a paper entitled **Functional Dystocia in Normal Pelves: Recognition and Management.** (For original article see page 246.)

DISCUSSION

DR. JAMES K. QUIGLEY, ROCHESTER, NEW YORK.—Our interns and nurses examine the fetal heart every thirty minutes, and oftener than that in the second

stage. I do not agree with the essayist regarding the question of rectal examinations. I will admit it is more difficult to teach the making of a rectal examination. The average intern will get very little in the first month from making a rectal examination but in handling a private case I think it is quite satisfactory. I believe incomplete dilatation of the cervix with the application of forceps is responsible for many dead babies. The statement that episiotomy is followed by a higher morbidity than spontaneous tears is a surprise. It certainly does not sound logical to me that a clean-cut wound will give more temperature than a laceration which is spontaneous. In the occipitoposterior cases I agree with Dr. Harrar that they are the *bête noire* of obstetrics. I use manual rotation, and forceps rotation very seldom. I think manual rotation followed by extraction will work out better in the majority of cases.

DR. ARTHUR H. BILL, CLEVELAND, OHIO.—There are two points in Dr. Harrar's paper upon which I would like to comment. The first Dr. Quigley took up namely, the question of rectal examination. I heartily agree with what has been said that in teaching students we should give them the experience of making vaginal examinations, but in my own private practice I find vaginal examinations during labor almost wholly unnecessary. It seems to me, one can detect practically everything he wants to know about his patients during labor by rectal examination. I have pursued the policy of practically eliminating the use of vaginal examinations during the course of labor and I do not make a vaginal examination during labor in one per cent of my patients.

The other point is with regard to the posterior position. To be sure, a large percentage of posterior positions will rotate spontaneously as Dr. Harrar has said. Sometimes these heads will rotate in a few minutes; sometimes they will rotate in a few hours or many hours, but it seems to me wholly unnecessary to allow a patient to go on in labor with its bad effects upon the child in the hope that the head will rotate spontaneously, when the physician can in a very few minutes convert that abnormal position into a perfectly normal position and save the patient all this extra work with its accompanying dangers.

In regard to the Scanzoni procedure, there is nothing dangerous about it; there should be no laceration connected with it and no damage done to the child's head. The trouble with the typical Scanzoni procedure as it is described in the literature is that it is described as a combination of rotation and traction; in other words, a spiral movement is made, as the head is drawn down, and that tears the vaginal wall and makes unnecessary pressure on the head. The ideal way to perform a modified Scanzoni rotation is to rotate the head in the station in which it lies, with absolutely no traction, just as you would do if you inserted the hand. A great advantage in using forceps in this rotation instead of the hand is that you do not displace the head so much as when the hand is inserted. If the technic is perfect, there should be no reason for laceration or any injury to the child during rotation. Laceration occurring during delivery after the head is rotated will also occur if there is a primary anterior presentation. I have followed the modified Scanzoni procedure ever since I have been in practice, and have performed it in hundreds of cases. I have yet to fail to rotate the head by forceps. It is seldom that great force is necessary if no traction is made with the rotation.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—I would like to endorse what Dr. Bill has said in regard to converting a persistent occiput posterior, by a Scanzoni operation, suggesting however using the axis traction forceps in the performance of the operation.

I did not hear the essayist refer to the conduct of breech presentations in the Lying-In Hospital. I should like to say that we have simplified that so much that

I will repeat again a statement made last year as to a simple and effective way of delivering breech presentations. When full dilatation and rupture of the bag of waters have been obtained, then under surgical anesthesia iron out the perineum, bring down the legs, and slowly and deliberately, taking plenty of time, deliver the anterior and posterior arm and the head. This will do away with the danger of breech presentations and make it possible for the operator to work without any hindrance on part of the patient. I consider that a great improvement over the old method of breech delivery.

DR. MAGNUS A. TATE, Cincinnati; Ohio.—I was much interested in Dr. Harrar's paper for a number of reasons. One the mortality report, namely, one death in 1800 women. That is a remarkable record to have, from an out-of-door obstetric clinic. I do not know of such a record anywhere else.

I was particularly interested in the strong emphasis he placed upon using the stethoscope so repeatedly for keeping tab on the condition of the child's heart. If we have a child's heart that is beating regularly we do not have to be in a hurry to deliver, but if the heart is becoming feeble or rapid, then action is called for.

I was pleased to hear his remarks with reference to manual rotation. I have practically given up the Scanzoni procedure, and rarely rotate the head with forceps, as I feeel I can do better work manually.

DR. PAUL T. HARPER, Albany, New York.—I want to say a word or two regarding the value of vaginal examination in the class of cases under discussion. I am willing to admit the desirability of making infrequent vaginal examinations, for there is nothing in connection with a vaginal examination that cannot be made out just as well or better in some respects by a rectal examination. However, the vaginal examination serves a purpose that cannot be accomplished in any other way. In fact, the necessity for artificial rupture of membranes is a definite indication for making a vaginal examination.

Rectal examination serves a great and useful purpose, in that it will help to eradicate puerperal infection, but the fact must not be lost sight of that in the absence of spontaneous rupture of the membranes we have a definite indication for vaginal examination. If we impress upon our students too strongly the desirability of making rectal examinations exclusively, we are going to lose sight of the fact that there is a definite indication for carrying out vaginal exploration.

DR. BURLEY LANKFORD, Norfolk, Virginia.—In this day of universal version and prophylactic forceps, it is hardly necessary to say that a paper of this sort is valuable.

I was glad to hear him use the expression active patience rather than inactive patience. I was also glad to hear him say that we can use a vaginal examination when we think it is necessary. There is no question, as Dr. Bill has pointed out, that if you are familiar with the pelvis before the onset of labor you can use rectal examinations all the way through, and there are few such cases in which it is necessary to make a vaginal examination, but you cannot teach students proper obstetrics unless you let them make vaginal examinations.

DR. HARRAR (closing).—I knew I would arouse some criticism regarding vaginal versus rectal examinations. There is a great bug-a-boo about vaginal examinations. A man who is surgically trained should be able to introduce his fingers into the vagina as safely as into the peritoneal cavity. Our results and our morbidity with vaginal examinations are satisfactory to us. Many of our cases are first seen by us in consultation and cases are admitted as emergencies or handled by students and interns, who have not had the opportunity of the antepartum examination. We think it is necessary for them to make one vaginal examination to determine

exactly what is going on, but we limit vaginal examinations to the fewest number possible.

As to manual rotation versus the Scanzoni procedure. Dr. Bill has done a great many that we would not think necessary. In over 8000 recognized posterior occiputs occurring in 41,000 labors, we only had 443 that required interference. Not all of them were forceps cases. If a posterior occiput case is progressing in good flexion, I see no reason for interference, provided the woman does not get tired. If there is increasing extension, or advance ceases, interference is necessary, but it does not happen very often.

DR. MAGNUS A. TATE, CINCINNATI, OHIO, presented a paper on **Pituitrin in the Second Stage of Labor.** (For original article see page 252.)

DISCUSSION

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—From being an earnest advocate of the use of pituitrin, I have become a very cautious and occasional user of the drug, not from any fear of its effect, or any doubt of its efficiency, but from the fact that the occasion now arises less often to use the drug. No woman should be allowed to become exhausted during a long continuous labor. If we have a long continued first stage the woman can be given a well earned rest by a narcotic. If she has an ineffective second stage of an hour or two hours, you should resort to direct methods. In a multipara with a relaxed perineum you perhaps may resort to small doses of pituitrin, and I say small doses because you can never tell how the drug is going to act, and if you use pituitrin at all, you should use the same brand of pituitrin at all times in order that you may become acquainted with the comparative strength of that kind of pituitrin. In primiparae we have much better methods to assist with labor when it seems to lag. We can use full surgical anesthesia, dilatation of the perineum as brought out by Potter, and the application of forceps in delivery as compared with the doubtful result that may happen with small or with large doses of pituitrin.

DR. GRANDISON C. ROYSTON, ST. LOUIS, MO.—Pituitrin is a valuable agent in shortening the third stage of labor, I think most of us agree as to that. That it is a dangerous drug is also well known. The point of Dr. Speidel should be well taken. We should start with a small dose and with the same preparation with which we are familiar. We begin with two minim doses. Some patients seem to have an idiosyncrasy toward pituitary preparations. We cannot say always what effect two minim doses will have on one patient, and what effect it will have upon another patient unless at the time the dose is given the hand is placed on the uterus and one feels the uterine contraction. After a two minim dose during the second stage, I have observed a tetanic contraction of the uterus which lasted 13 minutes. The fetal heart beat dropped from 120 to 80. I feel that the baby in this case would have been asphyxiated had the tetanic state of this uterus not been forced to relax. I have had four instances where anesthetics were necessary to stop the tetanic contraction of the uterus following two minim doses of pituitary injections. I have had two cases of stillbirths attributed to the pituitrin in doses of less than five minims.

DR. ADAM P. LEIGHTON, JR., PORTLAND, MAINE.—The indications and contraindications we all agree to, but there is one of which he did not speak and which I would like to mention. I believe there is great necessity for a thorough knowledge of the past history of the woman, that is, any question as to rheumatic

fever or scarlet fever, or myocardial disturbance. It is of the utmost importance that we should know about this. I never use pituitrin or pituitary extract in any dosage over four minims, and only in multiparae. I recently had a women under my observation from the fourth month of pregnancy. She was a healthy looking individual. I took her blood pressure and examined the urine regularly. When she went into labor I was called to see her; I found she had a three-quarters dilated os and good engagement. I gave her four minims of pituitrin. While I was putting on my apron and gloves I heard deep breathing. I turned around and found the woman was cyanosed. There was mucus coming from the mouth and she was dead. I looked for a knife; and the husband did not have a pocket knife, so I got my forceps out and delivered the baby. It has taught me a lesson however, and I always inquire now as to whether or not there is any possibility of myocardial disturbance. We should always bear in mind a history of rheumatic fever or of scarlet fever on account of the possible incidence of cardiorenal disease. I have come to realize that pituitrin, while a most valuable obstetrical adjunct, is also a very dangerous drug.

DR. H. WELLINGTON YATES, Detroit, Michigan.—Some two years ago I was called to a patient whom I had confined two or three months previously, and this was her first menstruation after that event. She was flowing so freely, that her husband, a doctor, thought her life was in jeopardy and not having ergot at hand he gave her one ampoule of pituitrin. Within a few moments she had difficulty in breathing and became cyanotic. He could scarcely get her pulse; she felt faint, vomited, and had definite symptoms of anaphylaxis. He administered 10 minims of adrenalin, I was at his house in fifteen minutes and there had taken place that which we might have anticipated if our view of anaphylaxis had been true. I mention the use of this drug as a possibly dangerous one from its anaphylactic effect as well as the one for which it was intended and next to elicit any further comments that may be made concerning these phenomena. I referred this matter to the head of the Biological Department of Parke, Davis & Company, and he went into a very careful consideration of the question and assured me that there was but an infinitesimal portion of a grain of the proteid in each ampoule of the product and that he could scarcely believe it was anaphylaxis in this case, but it had seemed to us quite different.

DR. SAMUEL A. COSGROVE, Jersey City, New Jersey (by invitation).— There are one or two considerations which I think ought to bear on the discussion in reference to the use of pituitrin. Any obstetric consultant cannot but be impressed with the lack of consideration of the specific contraindications that Dr. Tate has mentioned, in the hands of the average general practitioner, and the not infrequent tragic outcome which may result from disregarding these contraindications. Also, if Dr. Tate's contraindications are clearly applied, there will be only a small residue of cases which need pituitrin; and if in addition to the rigid application of Dr. Tate's contraindications we make allowance for a margin of error in estimating some of these contraindications even by good men, the number in which pituitrin is properly indicated will be still further reduced. In that small number of cases it seems to me that the substitution of anesthesia and mechanical relief, with its entire elimination of pain and psychic shock, is very much preferable to the increase of the woman's pain incident to the use of pituitrin, even though the period of that pain is lessened, and certainly the simple mechanical measures necessary in the small group of cases in which pituitrin could be properly used would not be conducive to any considerable trauma.

DR. JAMES K. QUIGLEY, Rochester, New York.—Some eight years ago I became rather enthusiastic over pituitrin, so much so as to report in two papers my results, and I have no reason yet to regret my early enthusiasm. I started

with small doses and I use about two minims now. I do not use quite as much as I did. I apply forceps more often now than then. In using pituitrin one should have an anesthetic and forceps available, which usually means a hospital case. I feel like Dr. Tate with rigid indications, and bearing in mind the rigid contraindications, we can still give pituitrin in the second stage of labor.

DR. FRANCIS REDER, St. Louis, Missouri.—In speaking of pituitrin I am not going to refer exactly to pituitrin as indicated in labor. I wish to cite a case that came under my observation recently. I was called in consultation by an able physician who had made a diagnosis of hydatid mole in a woman having a tumor reaching to the level of the umbilicus. Rapid growth and loss of blood occurred repeatedly. Upon these features the doctor based his diagnosis. In examining the abdomen I found that the mass extended higher on the right side than on the left; she had been sick in bed for a week. It was decided to operate. I went about this operation very cautiously as I had not entirely dismissed the possibility of a pregnancy. Upon opening the abdomen a uterus presenting all the aspects of pregnancy was found. I could get the fetal head well into my hand, but on account of the large amount of amniotic fluid I did not succeed in palpating the body of the child. I delayed operation purposely, being desirous to know whether the fetus was alive or dead. There were no movements. The abdomen was closed. I had trusted that my manipulations would be sufficient to bring on uterine contractions and expulsion of its contents. They did not. Two weeks later, after the abdominal wound had become securely healed, three bougies were introduced to stimulate the uterus to contractions. Much to my surprise, a week passed before any contractility of the uterus took place. These contractions were very weak. In removing the bougie and the tampons, I found the os sufficiently dilated so that I was able to extract the child. There was considerable bleeding. You might call it a hemorrhage. Ergot was given by mouth and hypodermatically with no encouragement. I had recourse to pituitrin. It was used with great caution. A half ampule caused only moderate contraction. Two hours later the other half was given which caused a firmer contraction, so much so that with the aid of an intrauterine tamponade the bleeding was checked. The pituitrin was not repeated, but the tampon was kept in place. For a week this woman was very sick. She was not toxic, although symptoms of absorption manifested themselves by a chill and fever of 104° four or five hours before delivery took place. I do think that this patient was benefited by giving her pituitrin.

DR. TATE (closing).—If the members of the Association will read the literature on pituitrin, as I have done in the last six months, they will find scattered throughout, numerous cases reported where pituitrin is put down as the cause of some complication or death of the patient. I cite one case to illustrate. The patient was an Austrian woman who had a normal first pregnancy and labor. With the second labor, a midwife was engaged. After being with the woman thirteen hours and there being absolutely no progress, the midwife began to give pituitrin with the result that rupture of the uterus followed, the woman was hurried to the hospital, the uterus removed, and the patient died. This death was put down as one due to pituitrin, and yet an obstetrician would know that it was a case in which pituitrin should not have been used. You will find many such cases reported throughout the literature.

Another thing that strikes me as being rather peculiar is this: I hear men speak of the dangers of pituitrin in society meetings, and yet they use pituitrin in their practice.

I have never had any cases like those reported by Dr. Royston, and let me repeat, I would not think of using pituitrin in every case I encountered, but select

my cases. The case has to be, as far as I can make out, a normal one. I would not, for one instance, think of giving pituitrin to a patient who had rheumatism, with a heart lesion so bad that she had to sit up in a chair, and in the second place, when I give a patient pituitrin, she is in bed or on the delivery table, not walking around the room.

DR. ARTHUR T. JONES, PROVIDENCE, R. I., presented a paper entitled **Malformation of the Uterus and Appendages.** (For original article see page 254.)

DISCUSSION

DR. HERMAN E. HAYD, BUFFALO, NEW YORK.—I have had one interesting experience which occurred some years ago, to add to the doctor's paper. The patient was a young woman who had been previously operated upon for a chronic appendicitis, and I saw her three years afterward. She complained of backache, constipation, and considerable pain during menstruation, in fact, the usual symptoms associated with a broken down, invalided young woman. I made an examination through the rectum and at once diagnosed a retrodisplacement. I told her, that a more careful examination could be made under anesthesia, at the time of operation. I curretted and proceeded then to open the abdomen and found a very interesting situation. There were very dense adhesions as a result of the previous appendix operation, so much so, that scissors had to be used freely in order to separate the tissues and leave a sufficient amount on the bowel to protect it from injury. I found an absence of the left tube and ovary, in fact, the left side of the broad ligament looked like a sickle. Of course, it was not possible to do an intraperitoneal shortening with only one ligament, so I fastened the uterus forward and she made an uneventful recovery. In the course of three or four years, she developed a swelling on the left side, which at operation was found to be an inguinal hernia with the left tube and ovary in the canal. The case is interesting from a congenital and anatomical standpoint and secondly, from the deductions which can be made from the failure of the first operation. All women, married or single, should be examined *per rectum* or *per vaginam* before undergoing an operation for appendicitis. If an operation for chronic appendicitis is to be performed, then the incision can be made through the center of the abdomen, if there is any reason to be suspicious of any uterine or ovarian trouble, and both conditions can be corrected. I have known many cases where if this precaution had been taken, it would have prevented the necessity of a second operation for pelvic trouble as in this case.

DR. DAVID W. TOVEY, NEW YORK CITY.—I know of one instance where a diagnosis was made of fibroids with incomplete abortion at three months, and the physician curetted a hole to the size of a silver dollar through the center of the septum between the uterus bicornis. As you will recollect, the nonpregnant side of the uterus always enlarges during pregnancy in these cases of double uterus.

In another case where there was pregnancy on one side with double uterus, she had had babies from both sides. There was a single vagina. In that case there was an ectopic, and it was easy to remove one horn and leave a normal uterus.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I have seen quite a number of cases where the conditions were recognized only at the operating table. One patient was a young girl seen in consultation, well developed, about fifteen or sixteen years of age with a history of regular, normal menstruation. Gradually, for

the last year or so, she had more pain than usual, and during this particular menstrual period, after a day or two of pain the family doctor was called and treated her for two days. She had a pulse of 150, a temperature of 104°. The hymen was intact and rectal examination demonstrated a tumor filling the pelvis completely, and extending half the way up to the umbilicus. I did not suspect the real cause of the difficulty, but as I opened her abdomen I discovered a double uterus. The tumor was one-half of the uterus filled with menstrual fluid. She had developed a general peritonitis. I immediately closed the abdomen, put her in the lithotomy position, and with some difficulty from below I was able to locate where the cervix should be, and with the point of a sharp scissors entered into the uterus then with uterine dilator, enlarged this opening and emptied the uterus. The girl made a prompt recovery. She married, and became the mother of three children and had no trouble from the three confinements.

DR. MAGNUS A. TATE, CINCINNATI, OHIO.—I desire to present a case that came under my care about three years ago, a young girl, 15 years of age, who suffered intensely from dysmenorrhea, was backward in her school studies, and associated with children about twelve years of age. The doctor had treated her for six months without any alleviation. She was sent to the Good Samaritan Hospital, put under an anesthetic and we found a double vagina and two cervices, and one uterus which deviated to the left. I naturally thought at first that she also had a double uterus. A sound was placed through one cervix into the uterus, but in the other cervix it would only go about one inch. We dissected off the blind cervix and the vaginal partition. The dysmenorrhea did not improve. A year following that, she had an acute attack of appendicitis. I operated, removed the appendix, and on examination found both tubes and both ovaries to be perfectly normal, the uterus was tilted over to the left side, but there were no adhesions. Since the removal of the appendix, she has improved much in general health, and the dysmenorrhea is not so pronounced.

DR. ARTHUR H. BILL, CLEVELAND, OHIO, presented a paper entitled **Should Pubiotomy Be Recognized as a Justifiable Operation in Obstetrics?** (For original article see page 258.)

DISCUSSION

DR. ADAM P. LEIGHTON, PORTLAND, MAINE.—If pubiotomy is a ''competitor of craniotomy,'' then I believe it has no place in obstetrics because craniotomy is a confession of carelessness, inattention, and lack of skill. The indications for pubiotomy are none other than can be met with version, the induction of labor or cesarean section. I am not a believer in pubiotomy, and it has no place in rational obstetrics.

DR. JOHN OSBORN POLAK, BROOKLYN, NEW YORK.—Dr. Leighton's remarks are particularly good if we can always control our prenatal work; but to those of us who are unfortunate enough to have services where every bit of bad obstetrics in the locality is tossed to us, it is a question of deliberately sacrificing the child or letting the woman go until the child dies, or subjecting that woman who has been repeatedly examined through a hairy vulva with ungloved and unclean hands to a cutting operation, such as section, whether it be extraperitoneal, transperitoneal, or the classical. Every one who has had that experience believes that there are cases in which pubiotomy is indicated. Again, sometimes we misjudge a funnel pelvis. Usually we feel that if the measurements of the outlet, the bisischial plus

the posterior sagittal totals more than fifteen, as stated by Klein, the patient will have a sufficiently large posterior sagittal to allow the head to pass through the outlet. I have seen two cases where this was so, and yet when the head was at the outlet the head could not be delivered, and pubiotomy was required. I have seen neglected face cases where the uterus was drained for hours of its waters, where version was an impossibility, where the mother and child were saved by pubiotomy. Dr. Bill truly said that pubiotomy is never an elective operation, but when he said it has a place in obstetrics he also said something that every one of us should recognize.

DR. JAMES E. DAVIS, Detroit, Michigan.—I want to say a word about postmortem pubiotomy, when evisceration is to be done quickly. The technic should be simple and effective. Erdheim, of Vienna, uses the edge of a knife in palpating for the line of synthesis, then the blade is driven through the union by a few successive fist blows upon the back of the knife, only a few seconds being required for the execution of the work. If this type of operation is indicated the simplicity and effectiveness of this technic is to be recommended.

DR. QUIGLEY.—I would like to ask two questions, one the average amount of space he obtains, and the other how long does it take to do the operation.

DR. LEIGHTON.—I would like Dr. Bill to mention the after-care of these cases, the time for recovery, and the lack of union, and the possibility of sepsis.

DR. BILL (closing).—In regard to the general status of pubiotomy, I think I have made myself perfectly clear that I consider it an emergency procedure, and I will agree with Dr. Leighton that if the prenatal care had been perfect, and that if the proper care had been followed during the course of labor as outlined in the paper, these indications would not arise.

In answer to Dr. Quigley, I will say that I made some experiments at one time with the bony pelvis in regard to the expansion and concluded that it was not best to try to get a separation of more than two fingers' breadth between the ends of the bones; when greater separation was caused there was considerable elevation along the anterior surface of the ilium and sacrum, that is the anterior sacroiliac ligament, and there was a possibility I think of some loosening of the sacroiliac joint. Up to that point I did not find that it occurred. I made these experiments on the pelvis by taking blocks of wood, held together by a turn buckle of which the conjugate diameter could be increased to varying degrees, and the separation of the pubic bones and elevation along the sacroiliac point determined. I have been able to insert two fingers between the ends of the bones in clinical cases.

With regard to convalescence, I have kept these patients in bed three weeks. You do not get bony union in most cases; there is, however, a firm, fibrous union. Three weeks is the average length of the convalescence.

With regard to the after-care, it is not as smooth as that of cesarean section. That is one of the disagreeable things about it, and that is one reason why we consider it an emergency operation. But I will say this: I had one patient who did not know that she had a pubiotomy performed until her husband told her two months afterward. She knew that her pelvis was bound with adhesive plaster, but did not suspect that anything like a pubiotomy had been done. After all, the convalescence was not so bad. So far as the kind of union of the pelvis is concerned, there is little difference in the functional result.

In the literature there are cases of sepsis reported. In my own experience the results have been good. There are cases of sepsis after craniotomy; there are other cases in which sepsis has developed after forceps. As I see it, a well per-

formed pubiotomy has no direct connection with the sepsis which is present in these cases nor does it add materially to the danger of infection.

DR. HALL.—You cannot say that with reference to craniotomy?

DR. BILL.—A certain percentage of craniotomies is followed by sepsis.

DR. H. W. YATES, DETROIT, MICH., presented a report of the **Genital Malformation in a Child of Eight Years, Associated with Acute Suppurative Appendicitis.** (For original article see page 261.)

DISCUSSION

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—Dr. Yates spoke of the mental development associated with this malformation and some work which I have been doing this summer on the urinary tract leaves with me the impression that malformations of the urinary tract are frequently associated with malformations of the brain. This will be referred to in my paper tomorrow.

While the doctor was presenting this case I was reviewing in my mind the comparative anatomy of the pelvis. In all forms of the higher vertebrate we have complete bony vertebrae. The elements may vary in proportion as well as in their placement. For instance, the acetabular bone which in the mole is very large we very seldom think of in considering the human pelvis; and yet it is present, although not very manifest. In the lower forms of life, like the snake, the fish and the shark, there is an incomplete pelvic girdle. I know it is often said, the snake has no pelvic girdle, but in some of the larger ones of the Orient, like the cobra, they not only have a pelvic girdle, but they have hind legs. In the shark there is lack of fusion of the elements, which elements are connected with the pelvic fin. The bony fishes present another type in which the elements are united at the center and connect with the vertebral column. The amphibian has a complete pelvic girdle—while the elements may be cartilaginous, the girdle is always complete. So in nearly every animal, except in snakes, we have some form of a pelvic girdle, and except in the snake it would seem to be impossible to have locomotion on the ground without some form of pelvic girdle. In this connection it is interesting to note in this patient of Dr. Yates' how much locomotion is interfered with on account of the pelvic girdle deformity.

DR. ROBERT FARR, MINNEAPOLIS, MINNESOTA.—Is it not true that in most cases of exstrophy of the bladder we have the absence of the bony symphysis?

DR. RUFUS B. HALL, CINCINNATI, OHIO.—The remark in reference to congenital absence of the vagina, and that these patients were mentally defective, brings up a point in my personal experience.

I was consulted some years ago by a woman, 36 years of age, a teacher physically well developed, with perfect development of the breasts, but she had never menstruated. She wanted to know if she could get married. She did not know why she did not menstruate. She had never been examined. A most thorough examination failed to find even the rudiments of ovaries or uterus. She had no vagina, otherwise the vulva apparently was all right, until you separated the labia you would think she was a normal woman.

Another case more recent than that was a married girl, and while she was not an imbecile, she was not bright. She married when she was eighteen. She was an orphan girl who had been earning her living since she was twelve years of age as a domestic. She had never menstruated; she had no ovaries or uterus that could

be found, and no vagina, and an attempt at sexual intercourse resulted in tearing her urethra open, and she had incontinence of urine when she came to me three weeks after her marriage.

DR. DAVID WILLIAM TOVEY, NEW YORK CITY.—I desire to mention the case of a young, well developed Italian woman, 24 years of age, married four years, she had no vagina. Her husband brought her to me for an operation and to find out if she could have children. At that time we did not know of the Baldwin operation but only the operation of making a hole for the vagina and transplanting some skin. As I have said, she had been married four years, and as near as I could ascertain from what she said, they had intercourse between her thighs. This woman disappeared from my observation. Later I was called to court and the judge annulled the marriage. The husband was willing to live with her if she could have had a vagina made.

DR. YATES (closing).—With regard to the locomotion, as far as I can see, she has as good locomotion as any child. As to her mental attitude she has no desire to play with other children.

Regarding exstrophy of the bladder in association with lack of union and fusion of the pubic bones, I will say that the point of Dr. Farr is well taken and commonly recognized. Fusion of these bones is not present when exstrophy of the bladder exists.

DR. FRANCIS REDER, ST. LOUIS, Mo., presented a paper entitled **The Tragedy of a Sacral Periosteal Sarcoma**. (For original article see page 266.)

DISCUSSION

DR. JAMES F. PERCY, SAN DIEGO, CALIFORNIA.—It is difficult for me to talk about cancer without alluding to my method of cautery heat in its treatment. As I see it the profession is not quite ready to accept this method at its full value. I cannot refrain from questioning if the outcome in this patient would not have been different if the mass had primarily been removed with the cautery knife, slowly dissected out as Dr. John Byrne dissected out a carcinomatous cervix in former days. Then when the growth was out he reapplied the heat to the tissue surfaces that were left with his dome-shaped cautery tip until they were of the consistency of horn or of leather, in this way obtaining the maximum penetration of the heat. You cannot use the cold steel knife in the treatment of cancer without incurring the very great risk of further dissemination of the disease, and not only dissemination but stimulation as well.

We all know that in 35 per cent of the cases of carcinoma in the pelvis that die without treatment, complete postmortems show that the disease has remained absolutely within the pelvis. You cannot go into a mass of cancer in the pelvis or anywhere else in the body with the knife unfortified with heat without stimulating it into new virulence. This can easily be proved and has been proved over and over again in experimental cancer in laboratory animals.

I would like to ask Dr. Reder, whether there was any attempt to control the pain by caudal anesthesia?

DR. REDER.—No.

DR PERCY.—I have had two patients, both women, where metastasis developed in the pelvic bones following uterine carcinoma in one case and from a malignancy

of the left breast in the other. These were last resort cases when I first saw them. This suffering was of the same atrocious type as that described by the essayist in his patient. Morphine will not relieve them, especially after the first two weeks. I know of one case where fifty grains of this drug a day gave no relief. Both of my patients were immensely relieved by caudal anesthesia with procain.

In carcinoma of the rectum, there is an increasing number of reports of cases where my first type of cautery is being used successfully. It is merely shoved into the rectal mass and sufficient current turned on to produce a gentle simmering sound heard when the ear is held near the instrument in the rectum. It is allowed to remain for an hour or even longer or until it is certain that heat penetration has been thoroughly attained in every part of the morbid growth.

Dr. W. H. Kiger of Los Angeles reported 25 cases of rectal carcinoma, treated by my technic, at the St. Louis meeting of the American Proctological Society in June. He has practically abandoned all surgical methods in the treatment of rectal cancer for that by the local diffusion of heat. His successful results have been most gratifying and even remarkable.

Last May I received a very enthusiastic letter from Dr. Edward Martin of Philadelphia reporting that one of his private patients, on whom he had used my cautery for rectal cancer seven years ago, is not only alive and well but also free from all evidence of cancer.

In the surgical treatment of cancer we must eliminate the positive danger from dissemination and stimulation of the cell growth, and this can positively be accomplished by our substituting the hot for the cold knife.

DR. W. WAYNE BABCOCK, PHILADELPHIA, PENNSYLVANIA.—It seems to me, we are not getting very far in our concept of the treatment of malignant disease until we carefully differentiate reactions of the various sarcoma and carcinoma to treatment. The first case of Dr. Reder was one of sarcoma, and a peculiar type of sarcoma growing in the pelvis. Sarcoma in general presents an entirely different therapeutic problem from carcinoma, although carcinomas have protean manifestations and types of malignancy. Against the more malignant type of sarcoma I know of no treatment that is effectual. Let us take, for instance, certain malignant periosteal sarcomas of long bones, where a cure from even high amputation is practically unknown. The few cases that have lived for more than a year or two years have been cases, for the most part, where there was some question as to the diagnosis. On the other hand, giant cell sarcomas or myeloma of bone are relatively benign. They recover after thorough excision or x-ray treatment. It is an entirely different proposition as against some of the malignant tumors where operation seems to determine where the return will take place.

I recall a case of carcinoma of the hand where amputation was done at the wrist, and the growth metastasized in the stump. Amputation of the shoulder was done and the tumor reappeared in the scar. Then, after an interscapular thoracic amputation was done, metastasis occurred on the chest wall. In other words, wherever the knife had made its impress and had produced traumatism the tumor came back.

Let us take the case of melanotic sarcoma, or melanoepithelioma, if you do not wish to call them sarcoma. I wonder if any of you can recall a case where excision or other treatment of such a growth has been followed by an ultimate cure. I do not. Too often operation seems to cause the growth to flare up and to grow rapidly. With carcinoma we have a different problem to deal with, and I wonder if I understood Dr. Percy correctly when he said that operation only produced stimulation. In carcinoma of the lip or where the growth is not larger than a pea, free excision according to Bloodgood, gives 100 per cent of cures. With an ad-

vanced carcinoma of the lip, an extensive block dissection, cauterization, x-ray and radium are all usually ineffective.

As to growths in other parts of the body, the results from hysterectomy for carcinoma of the body of the uterus are probably not excelled by methods now in use, while radium has largely displaced hysterectomy for cancer of the cervix, some cases will do best if we let them alone. I think somebody should classify the various malignant growths in relation to the type of patient in which the growth develops, for whether the patient is fat or lean, old or young, also has a great influence on the progress of the disease.

DR. WILLIAM SEAMAN BAINBRIDGE, NEW YORK CITY.—Dr. Babcock has given an impressionistic picture of our absolute ignorance in regard to the essential cause of cancer, including sarcoma. While agreeing in the main with his discussion, I may say that my experience in relation to melanotic sarcoma is not in conformity with his. Melanotic sarcoma is indeed a very fatal form of the disease, but there are cases that have been cured. The following two illustrative cases are on file in my office, and I give them to you here so that they may be put on record in this connection: 1. O. L., male, fifty-seven years of age, married. February 29, 1912, this patient was operated upon, in another city, for a melanotic sarcoma of the neck.

Two months later recurrence took place and in May, 1912, I removed a large melanotic sarcoma, adherent to the jugular vein and carotid artery, ligating the jugular vein.

The patient was discharged June 6, 1912, and a letter from him, dated September, 1922, states ''that he is in the best of health and has had no return of the disease.''

2. J. M., female, thirty-five years of age, single. This patient had, at birth, a small papilloma on each wrist. These remained the same size until she was 32 years old when the papilloma on the right wrist began to increase in size until it was as large as a silver quarter. It was melanotic in character, with scabs, and bled easily.

April 17, 1915, the growths were removed and proved to be melanotic sarcoma. The patient recovered from the operation and to date, (September, 1922) there has been no recurrence of the condition.

In a private communication recently received from Dr. Rufus B. Hall, he cites a case of a woman, 30 years of age, married, with 1 child 13 months old. At birth she had a slightly elevated black mole one fourth inch in diameter on the chest wall to the right of the sternum. The mole gradually enlarged and at the time of her marriage was about 1 inch in diameter and elevated about one fourth inch. A few days before her confinement in June, 1908, it became inflamed, enlarged, and discharged an exudate. Operation was performed forty hours after birth of child; there was a large open ulcer involving about one fourth the surface of the growth. Pathologic report: ''Melanotic sarcoma.'' There has been no recurrence and the patient is apparently in good health at the present time.

In regard to the spreading of malignant disease by operation, this is true in some cases. But is not a great deal of the untoward result in the use of the knife accounted for by the lack of recognition and practice of the lessons of Ordway and Tyzzer? Tyzzer states that ''every physician should realize the irreparable harm which may result from the manipulation of malignant tumors in their early development. * * * * * The palpation of the mass in question in repeated physical examinations, the violent scrubbing often employed in preparing the field of operation, is almost identical with that which I have employed for the experimental production of metastases.''

DR. REDER (closing.)—We had hopes when we received this high voltage apparatus from abroad that we were in a position to do much good for this patient. This woman displayed great courage while undergoing these treatments. Death came within the allotted time for such growths. She was subjected to the scalpel, to radium, and to x-rays. It was the knife that gave the greatest relief.

<hr>

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF DECEMBER 12, 1922

DR. RALPH H. POMEROY IN THE CHAIR

DR. FRANK R. OASTLER presented a paper entitled **Toxemia of Pregnancy. Acute Yellow Atrophy of Liver.** (For original article see page 271.)

<hr>

DR. ELIOT BISHOP reported a case of **Prolonged Ante- and Postpartum Toxemia of Pregnancy, with Recovery.**

This twenty-nine year old primipara, a physician's wife, was seen October 19, 1921, four and one half months pregnant, with no outward symptoms except occasional vomiting. Her general condition, blood pressure and urine were normal until January 10, 1922, when she developed edema of the legs, and albumin and casts appeared in the urine. On January 12, the blood pressure was 150-90, but she had no subjective symptoms of any kind.

She was put on a carbohydrate diet, allowed out of bed only an hour or two a day and, with that regime, the blood pressure rarely reached 150, the urinary output was ample, though the albumin heavily persisted; subjectively she considered herself to be not at all sick. As this child was considered, from several social aspects, extremely desired, interruption was postponed.

On February 14, near the end of the eighth month, however, the edema, which had been slight, suddenly increased, as did the blood pressure, which rose to 190, with a pulse of 120, the vision was markedly reduced, and the patient entered the Brooklyn Hospital; there the urine of sp. gr. 1.018 showed only a heavy cloud of albumin, and no acetone, but many hyaline and granular casts. The blood chemistry was: C.02-45; urea, 37-89; creatine, 1.78; sugar, 128 mg.; red blood cells, 47 per cent. There was marked edema of the back, genitals and lower extremities, and the phthalein output was 35 per cent in the first two hours, with an additional 10 per cent in the third.

The next morning, after consultation, it was decided to terminate the pregnancy, and the membranes were ruptured.

The onset of labor was slow, and the blood pressure ranged between 190-200 systolic. As active labor began, she was given a quarter of a grain of morphine. During labor, the systolic pressure reached 218. When the vertex got to the vulva, forceps were gently applied, and a four pound, six ounce baby was easily lifted out. The baby did not look at all well, but thrived, and at ten months weighs 21 pounds.

Aside from vomiting, the day after delivery was comfortable to the patient. She was catheterized at the end of twenty-four hours, and 49 ounces of urine was obtained, which contained a trace of albumin, but no acetone or casts. The blood

pressure dropped to 154-110, and we were misled into believing that the danger was rapidly disappearing.

However, the systolic blood pressure returned to 190, and averaged that for the next week. The urine output kept up, even developing a polyuria of 176 ounces on February 20; but, on Febuary 26 it became scanty, though hard to measure on account of lack of control. During the period of the arterial hypertension, the patient's greatest complaint was pain in the back of the head, neck and arms, particularly the latter. On February 23 temporary deafness occurred and the patient became restless and "nervous," and quite weak; the pulse was running from 120-136, and the rectal temperature between 100-101°, in fact, her pulse continued at that rate until a few days before her discharge from the hospital, thirty-six days postpartum, when it averaged 110.

The urine again contained a moderate number of casts. On February 24, however, she developed irrational periods and also stupor; and, on February 27 a left-sided hemiplegia. A diagnosis of cerebral thrombosis was made. From the ophthalmologist's report, which I shall summarize later, and his own findings, the internist did not concur in the neurologist's diagnosis, but felt that there were miliary cerebral hemorrhages, with edema. On March second, after a bad night, irrational and with Cheyne-Stokes' respiration, the general condition showed improvement, and the hemiplegia began to disappear, but a left saphenous phlebitis occurred, with a leucocytosis of 19,400, with 85 per cent of polynuclears.

General condition continued to improve, the mentality slowly clearing until it seemed normal, though a little sluggish on March seventh, and on March ninth, the ophthalmologist noted a definite improvement.

On March eleventh, a right saphenous phlebitis occurred, accompanied by temperature of to 101°. Examination of the chest that day, by the internist, showed the following. "Heart-apex in the fourth interspace, three and one half inches to left of middle line; the right border slightly to the right of sternum; sounds at apex suggest fetal rhythm; no gallop rhythm; lungs clear. Diagnosis, probable myocarditis." The urine at this time showed a faint trace of albumin, and no casts, and the systolic blood pressure, which, for a week, had been running between 130-140, now reached 120.

The second phlebitis subsided in eight or nine days, and on March twenty-first, in spite of the continued rapidity of the pulse, the patient was allowed up in a chair, and went home on March twenty-fifth. Her pelvic condition was negative; her appetite was good; her sleep was fair, and strength returning; her malaise was gone and her mental condition normal. A few days before discharge her blood showed 61 per cent hmgl.; 2,880,000 red blood cells; 11,600 white blood cells of which 82 per cent were polynuclears; her urine showed a heavy trace of albumin, but no casts or acetone.

On December 9, 1922, the ophthalmologist reported that with the beginning of her toxemia, the patient suffered an absolute scotoma (central) of the left eye, due to a retrobulbar neuritis, which cleared up completely in about three weeks, solely under the toxemia regime. This ocular pathology was another evidence of, and due to the toxemia. Retrobulbar neuritis is uncommon in the toxemias, in this case especially noteworthy in being monocular, also in the production of an absolute central scotoma which completely cleared up in so short a time. Prior to her entrance into the hospital, her vision was normal in all respects. Before induction, the vision in each eye was reduced to mere form perception due to papilledema, retinal edema, retinal exudate and hemorrhage, the exudative stage of albuminuric neuritis. This eye pathology was due to the increased intracranial pressure of cerebral edema and therefore dependent upon the intracranial complication. The fundus condition did not begin to improve until after she

had her cerebral accident. Yesterday the vision of the right eye was 20/20; of the left 20/70. The right fundus showed normal nerve; vessels apparently normal; several scattered areas of punctate pigment deposit in the retina; the macula which contained the radiant figure of albuminuric neuroretinitis, was clear. The left fundus was similar to the right, and in addition, the macula showed in its upper portion slight remains of the scar.

On December 9, 1922, her urine totalled 40 ounces, 1.019 sp. gr., with no sugar, a trace of albumin, 9 grains of urea to the ounce, no casts or kidney epithelium, and on December eleventh her blood pressure was 110-70.

This case is of interest for the following reasons:

1. To interrupt a pregnancy is an extremely difficult decision to make in toxic cases of this sort, as much, if not more so, than in eclampsia. Any woman who is toxic is better off without the child, but, what about the child? Moreover, the mother may be too toxic to stand interference that is too late. Each case must be sharply differentiated, particularly with the help of the internist; it is as much a medical as a surgical problem.

2. Termination of pregnancy may not terminate our troubles, as this woman developed a subacute nephritis, cerebral and retinal hemorrhages, with a resultant hemiplegia, with the strong possibility of permanent eye and brain damage, evidence of myocarditis, and a double saphenous phlebitis.

3. This train of pathology shows us that the toxins of pregnancy attack parenchymatous tissues, retina, brain, kidney, heart muscle, usually the liver; particularly the retinal and brain vessels, and the saphenous veins. Here the disturbance was not like an ordinary phlebitis, the redness and swelling and the tenderness in Scarpa's triangle were all missing, and there was only a slight temperature with the onset of one side.

4. A most suggestive clinical observation is that, during the period of greatest excretion of urine, this patient was not improving, but developing her gravest state. As the kidneys drew the water from the patient, toxemia increased; may not the toxins be in the edema? At this time, blood chemistry might have been of diagnostic value. Practically, this is the time, for purposes of dilution, to saturate a patient with fluids in one method or another, and mayhap, the common use of morphine may be beneficial, as it retards tissue depletion.

The obvious conclusion from the above is that these problems are primarily medical, and the major conduct of such a case, with the assistance of the ophthalmologist's diagnostic precision, belongs to the internist, where this was placed.

DISCUSSION

DR. HARRY G. JACOBI: (speaking on Dr. Oastler's case).—When one considers the blood chemistry as charted, without the clinical history of the case, it is rather difficult to say whether it is the blood picture of an acute yellow atrophy, a bichloride poisoning, a phosphorus poisoning, or of any other toxins which may produce tissue degeneration. In other words, in this case there was a definite toxemia, and once the toxic substance was removed by emptying the uterus, improvement was noted.

The important determination is the creatinine figure. The creatinine determination is particularly interesting in acute conditions because it is in these conditions that the creatinine content of the blood reaches enormous figures and really determines the outcome of the case. On the 18th of October the creatinine content was 8.25 and the next examination, performed on the 21st, showed a practically normal creatinine content of 2.5. If this were a chronic condition with a creatinine content of 8.25 the prognosis would be very grave. Such figures one frequently encounters in the terminal retentions of the chronic nephritides. In the acute

conditions,—and we have had several of these cases, particularly of bichloride poisoning,—recovery does take place even with so high a creatinine content.

Another point of interest was the discovery of leucine and tyrosin in the urine. Although we find these constituents in almost every case of acute yellow atrophy, they do not in themselves make the diagnosis of acute yellow atrophy as pointed out by Dr. Oastler. I believe that if we were to examine the urine routinely in all the toxemias of a pregnancy we would find two constituents more often than we have in the past. A further point of interest here is the carbon dioxide combining power of the blood plasma. That is a very important determination to make in any one of the toxic conditions encountered.

Dr. Oastler also mentioned the icterus index which was devised at our laboratory. It is a very simple procedure and I presume it will interest you because of the difficulty that one encounters clinically in determining with the unaided eye, whether jaundice is increasing or decreasing. The personal equation enters into that a good deal. We have devised a method whereby we can determine rather accurately the amount of jaundice and whether it is increasing or decreasing. The procedure is very simple. It merely consists in taking some of the serum and comparing it with a standard potassium bichromate solution, with a Duboscq colorimeter.

DR. HAROLD BAILEY.—This is the first case where there has been more than one observation on the blood chemistry in acute yellow atrophy. The blood sugar in this particular case was high through this toxic period. That is one more indication of disaster in the liver.

One of the most interesting things here shown is the fact that the CO_2 content was high. As a matter of fact at no time was it below the point seen in normal pregnancy. That is entirely contrary to our ideas in these starving cases, and although I listened intently I did not quite catch how much food this woman was able to take while this process was going on.

There is a case for comparison which has one or two points which I think are really of great interest. We had a case with pain in the lower abdomen, just as in Dr. Oastler's case. This patient was operated upon on the surgical side of the hospital and a more or less normal appendix removed. She became intensely jaundiced and was eventually transferred to the obstetrical ward. At that time she was comatose. Her uterus was emptied, blood tranfusion was done and sugar solution rectal irrigations. She slowly recovered. It seems to me that this is an almost parallel case and perhaps with the clinical point of pain in the abdomen, which is more or less important.

On the other hand, this year I lost a case of pernicious vomiting, the woman dying a day after the emptying of her uterus. The blood chemistry in that case was absolutely normal throughout the day before she died, except that the CO_2 content was 36.

As regards the second case (Dr. Bishop's), I had last March an almost similar one in a woman 10 weeks' pregnant, admitted as pernicious vomiting. She vomited throughout a period of about one week. We then felt she was developing cerebral symptoms and took the spinal fluid. This led to the diagnosis of tuberculous meningitis. We had a little difficulty in convincing the neurologists and the internists that such was the proper diagnosis, but they finally took her from us with the uterus unemptied. She died the next day and autopsy showed tubercular meningitis.

DR. W. H. CARY.—What was the size of the uterus in Dr. Oastler's case?

DR. HERMANN GRAD.—Several years ago I had a case similar to the one reported by Dr. Oastler. I was called to operate on a probable case of ectopic ges-

tation. The woman, pregnant 2½ months, was suddenly seized with violent abdominal pain and went into shock. There were several facts that made me feel that the case was not one of ruptured ectopic. First of all, she had a temperature of 105° F. She was comatose and her hemoglobin was 75 per cent, the leucocytosis was high and the urine contained a large amount of albumin with blood (catheterized specimen). The case showed very marked evidence of kidney disturbance and on that basis we emptied her uterus. The patient was entirely comatose. The next day she became jaundiced and then a diagnosis of acute yellow atrophy was made. She remained comatose for about a week. Two spinal punctures were done during that time and proved absolutely normal. The patient finally recovered. I was glad that I did not accept the diagnosis and operate on this case.

DR. FRANK R. OASTLER.—The CO_2 combining power in my case, considering the degree of acidosis, was comparatively high. I figure, from my experience, that if it gets up around 30, the case is almost certain to terminate fatally. The normal is 53 to 77, but 56 to 60 is, I think, a pretty good average. The uterus, was about the size of a two months' pregnancy. She had not menstruated for seven months. After one of her pregnancies she was curetted and following this she only had a drop of blood once in a while. In other words, she had pretty nearly ceased menstruating.

I would say she was taking her food regularly up to the time of admission. Following that, for a period of three days, she had practically no food. The only thing she got was 5 per cent glucose solution by rectum. She was vomiting and nauseated and in such a serious condition that she was practically moribund for two or three days.

DR. GEORGE W. KOSMAK presented the report of a **Case of Rupture of the Uterus Through the Scar of a Former Cesarean Operation.**

This patient, Mrs. B., was admitted to the Lying-In Hospital, October 27, 1922, in the early morning with a history of having gone into labor during the previous night (stoppage of pain after an hour). At the time of admission she was in good general condition, with a pulse of about 80, not having any pains and complaining merely of abdominal tenderness on palpation. In view of a previous cesarean section, for a generally contracted pelvis, preparations were made to repeat this operation. During the afternoon the fetal heart could not be heard but the patient claimed she felt the movements of the child. About noon a slight bloody show was observed. A personal examination an hour later showed a slight woman with good color, not complaining of anything and having a normal pulse rate. The abdomen was soft and the fetus distinctly palpable, giving the impression of being contained in a thin-walled uterus but no signs of fetal life could be elicited. The vaginal examination before operation, made for the purpose of rupturing the membranes, revealed a closed cervix and no presenting part could be felt. Nothing in the patient's condition afforded any clue to the findings at the subsequent operation.

The abdomen was incised through the former scar to the right and half above and half below the umbilicus. The abdominal wall was very thin and as the peritoneum was cut through, blood-stained fluid escaped. The incision was enlarged and a rapid survey showed an intact amniotic sac with a fetus apparently at term, which occupied the greater portion of the right half of the abdominal cavity. The placenta was at the lower pole of the sac and slightly attached to a rent in the anterior surface of the uterus. The bag of waters was ruptured and a large well developed fetus extracted which showed no signs of life. There was no maceration

of the skin, no pulsations in the cord and all attempts at resuscitation were unsuccessful. The placenta and membranes were then readily removed and a further examination showed the uterus firmly contracted, well down in the pelvis with an "L" shaped rent involving the original scar and extending transversely along the fundus as shown in the diagram. (Fig. 1.). There was no bleeding from the edges of the rupture and only a small amount of free blood in the abdominal cavity.

It was not thought advisable or necessary to remove the uterus because of its firmly contracted character and the rent was accordingly sutured with interrupted plain catgut in the usual manner. There were no other points of hemorrhage. The abdomen was closed in layers.
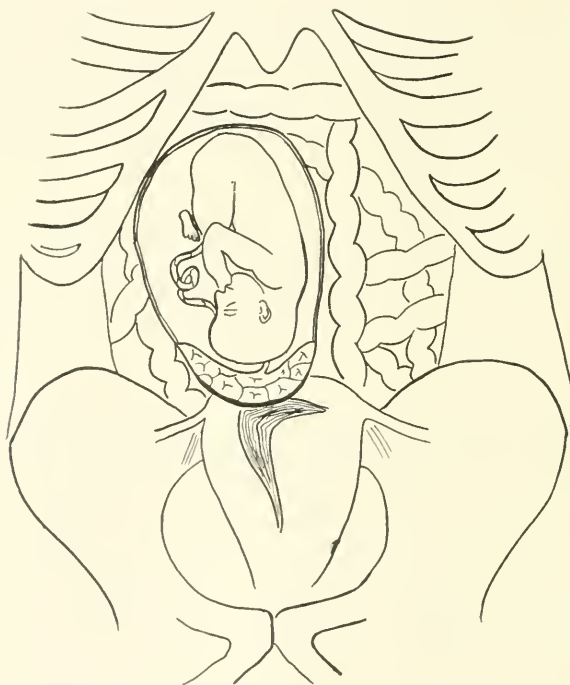
Fig. 1.—Schematic drawing showing extruded amniotic sac intact with fetus; the placenta slightly attached to uterus at the site of rupture, and the relation of the sac to the costal arch and intestines. The contracted uterus with the rent was in great part below the pelvic brim.

The postoperative convalescence was uneventful and the patient was allowed to go home at the end of two weeks. A postpartum examination made on December 8th showed the uterus well involuted, anteverted, not tender and quite freely movable. The abdominal scar was firmly healed and the patient's general condition excellent.

The interest in the case resides largely in the complete absence of shock associated with the extensive rupture of the uterus and likewise the lack of hemorrhage and complete extrusion of intact amniotic sac. Instances of rupture of the scar of a previous cesarean section are unfortunately not infrequent and careful studies have been made by a number of investigators to determine the predisposing factor. Infection of the operative wound, disease of the uterine muscle, pregnancies succeeding each other rapidly, prolonged labor without relief, and a

number of other causative factors have been brought forward to account for this condition. The fact that the accident occurs in the experience of almost every operator makes it incumbent to weigh the decision in every case where a cesarean operation is contemplated and to permit a thorough test of labor in each instance where no absolute dystocia exists, or where it is not necessary to resort to the operation as a life-saving procedure for the mother, such as in certain cases of placenta previa, intrauterine hemorrhage, or toxemia.

In the case under discussion the only factor which comes to mind is the short interval between the woman's two pregnancies,—only seventeen months having elapsed between the birth of her last child and the present accident.

The question of whether a sterilization of the patient was justified must be answered by the operator's own conscience. I did not consider that a uterus which was the site of an extensive rupture should be subjected to the risk of a future pregnancy in a woman of this type of intelligence. My reasons for not removing the extensively lacerated uterus were that the organ had contracted satisfactorily, there was no hemorrhage and no danger of infection of the peritoneal cavity from the rupture because the cervix was tightly closed and no vaginal examinations had been made. I considered that the continuance of menstruation was of great importance in this case, as this particular young woman would not thus be considered isolated in the ranks of her family and associates.

Dr. Victor L. Zimmermann presented a report of a case of **Rupture of Uterus in Labor.**

Mrs. H. M., admitted to St. Mary's Hospital, December 7, 1921, age thirty-six years, white, two miscarriages, four children alive after easy normal labors. Last menses February 20, estimated time of confinement, November 27. Pregnancy had been normal except for slight edema of ankles during last few weeks.

For four days previous to admission there had been indefinite pains accompanied by a slight reddish discharge, without well-established labor until early in the morning of the day of admission. After eight hours of hard labor forceps were applied by two physicians at her home, but after hard tractions for one hour, attempts at delivery were abandoned and she was sent to the hospital by ambulance. At this time the intermittent pains and contractions had ceased, and had given way to a severe rigidity of the uterus and abdominal walls, with constant pain. Temperature 97°, pulse 152 and weak, respirations 32. Heart sounds good and lungs showed no signs of edema, although there was quite marked cyanosis of the finger tips. The abdomen was extremely tender, symmetrically ovoid in the upper part, but showing a marked, hard, rounded projection in the left iliac region, which felt like the fetal occiput and where the tenderness was more marked; no fetal heart could be heard. Vaginal examination showed a dry and swollen vulva and an old laceration of the perineum. There was a prominent caput filling the brim, but no bony engagement. The cervix was fully dilated and well retracted, a thin rim only being felt on the right side. She was catheterized and only a few drams of bloody fluid obtained. A diagnosis of rupture of the uterus was made, and the woman prepared for abdominal section. She was given a quarter of a grain of morphine and 500 c.c. of saline intravenously. A good deal of bloody fluid appeared when the abdomen was opened by a long incision. The fetal head was found partly protruding through a rent in the lower uterine segment extending from the cervix to above the insertion of the broad ligament. The uterus was incised from the site of the rupture upward for a sufficient distance to permit the easy removal of the dead child. It weighed 9 pounds, 8 ounces. After removal

of the placenta the uterine wound was closed with a few sutures, and then a supra-cervical hysterectomy was done in the usual way. It was then discovered that there was a rent about 1½ inches long in the posterior wall of the bladder at its attachment to the cervix. This rent as well as the one in the broad ligament was closed with some difficulty. A gauze drain pushed down into the vagina, the peritoneum sewed over the cervix above this drain and the abdomen closed. A retention catheter was placed in the bladder. The after treatment was as usual, with plenty of morphine and heart stimulation. The patient had a stormy time for only 36 hours and then convalescence was good. The gauze drain in the cervix was removed in forty-eight hours and the next day a good deal of purulent discharge began and continued for about eight days. The retention catheter was not disturbed for one week, when it was removed for cleansing and replaced. The bladder was then washed each day with only one ounce of boric acid solution. All this time the urine contained a large quantity of pus. On the twelfth day a gauze vaginal tampon was inserted and then one ounce of methylene blue solution injected through the catheter. The tampon was removed in ten hours and showed no discoloration.

Three weeks after operation the patient was cystoscoped. F. 25 cystoscope passed with ease, a very foul urine removed from the bladder. The bladder contour was quite normal except at the base where the trigone was deflected downward. There was a general basilar cystitis of very marked degree; the edematous condition worse at the trigone and especially in the region of the right ureter ostium. At the base of the bladder was a puckered area, probably the site of a suture line; no pockets were found. When the catheter was passed up to the pelvis of the right kidney the urine was discharged under pressure. The ureter catheterized specimens were very clear in marked contrast to the vesical urine. Both specimens showed positive culture of B. colon and staphylococcus albus. For two months she was treated at weekly intervals. At the end of four weeks the cystitis was rapidly subsiding; there was still a positive B. coli culture from the right kidney; negative from the left. Pus cells per field, right 15 to 20, left 6 to 8. The final examination on March 6, three months after operation showed the woman in good physical condition, the abdominal wound well healed; a relaxed outlet with moderate-sized rectocele; the stump of the cervix not tender, no masses in the fornices and no tenderness. Cultures from both kidneys negative. Urine from right kidney 3 to 5 cells per field. Urine from left kidney 2 to 3 cells per field. Micturition normal.

DISCUSSION

DR. W. E. STUDDIFORD.—I have had three cases like the one which Dr. Kosmak has just reported. Two of them were operated on, one of them about four days after the occurrence of the rupture, and the other one about six days after rupture. In the first case the rupture was not diagnosed and attempts were made after the rupture had occurred to induce labor, with the result that the woman became extremely septic. On opening the abdomen we found a rupture of the uterus to the left of the median line, going through the fundus, with the fetus and membranes intact, but as a result of the infection, adherent and the seat of an infection evidently with the colon bacillus. That woman died shortly following operation.

The second case was one which I saw during the period of acute pain preceding the rupture and made a probable diagnosis of a uterus that was contracting and the probability of a rupture of a cesarean scar. Operation was declined at that time. The patient recovered from the immediate shock. Two days after the rupture she apparently was all right and was allowed to get out of bed, but the abdomen

remained distended, the uterus (which was about 7½ months' pregnant) apparently formed a mass in the culdesac, filling the upper portion of the pelvis. Six days after the rupture had occurred, we found the membranes, placenta and fetus covered by omentum or slight adhesions, the fetus undergoing maceration and the uterus torn through the left horn, to the left of the median line, the uterus well contracted, and aside from some adhesions of the omentum no signs of infection or hemorrhage. In that case there were a good many adhesions around the tube and a hysterectomy was performed. The woman unfortunately died about forty-eight hours later of pneumonia with no signs of infection of the abdomen at autopsy.

The third case was one which I reported at a meeting of the Society last winter. In that case there was an acute rupture and operation was done within an hour after the rupture had occurred. There was very little shock, just one acute pain and then the fetus was apparently forced into the abdomen, and there was very little bleeding.

There is one very significant thing in all four of these cases, including Dr. Kosmak's, and that is the position of the uterine scar. All of these cases ruptured through a fundal scar. In this case of Dr. Kosmak's, judging by his drawing, rupture occurred high up on the right side, and then it tore across above the old cesarean incision into the fundus. In reviewing the reports of rupture of a cesarean scar, we find that the majority of them occur where there is a fundal incision, and it is not entirely due to sepsis. It is probably due to retraction of the uterine muscle at the time of suture, or relaxation after the suture has been made, so that there is healing of the outer layer of the muscle and poor healing of the middle layer and of the endometrium, leaving a granulating surface, which probably makes a weakened scar.

I would like to ask Dr. Kosmak, in closing the discussion, to describe the location of this scar.

It seems to me that in operations on the uterus that the incision should be made not higher than the upper border of the intermediary segment, and that is probably one reason for the success of incisions in the lower uterine segment. It is also important to locate the incision as near the midline as possible.

DR. KOSMAK.—The recital of this case may bring about a feeling of doubt in the minds of some of you as to the diagnostic ability of the staff of the Lying-In Hospital in the presence of rupture of the uterus. She was seen by the staff man and made the trip in the ambulance from her home to the hospital. She was transported upstairs and was seen by the house surgeon and finally by me. Nobody made the diagnosis because there was nothing to call attention to the accident, and I cannot understand to this day why this sac after all the transportation and handling to which she was subjected, did not rupture. Palpation of the abdomen, as I said, seemed to show merely a thin-walled uterus. There was no tenderness at the time that I examined her, although the house surgeon told me when he first saw her she was quite tender.

In answer to Dr. Studdiford's question, I would say the drawing does not quite indicate the position of the scar. The original operation was done through the midline and the horizontal portion shown in the drawing here was the new rent. At the Lying-In, the cesarean incisions are ordinarily made below the fundus along the anterior wall of the uterus in the median line.

I think in this case there were probably two factors at work. There was infection in the former puerperium as shown by the more or less constant temperature during the first week, and a rapidly succeeding pregnancy. I have had cases with very serious infections of the uterine scar that went through a subsequent pregnancy without any difficulty at all, but in those cases there was a longer interval

between the pregnancies, whereas in this case there was a total of only seventeen months.

DR. J. MILTON MABBOTT.—May I offer a suggestion as to why the membranes are found unruptured? It is probably because of the contraction of a strong part against a weaker part. The membranes are practically loosened from the endometrium. The moment a part of the fluid with the membranes escapes from the uterus the abdominal pressure becomes greater by reason of the fact that more is extruded into the abdomen outside the uterus. Therefore, there is no particular reason why the membranes should rupture after that.

DR. ZIMMERMANN (closing).—This is the third case I have had of rupture of the lower uterine segment following instrumentation and a rupture into the peritoneal cavity. In all these cases there has been an injury to the bladder. I believe that the difficult part of the handling of these cases comes after the operation on account of the accompanying cystitis. In one of the cases there was an abscess of the kidney. I believe that the essential part of the treatment is up to the genitourinary surgeon.

DR. EDWARD W. PINKHAM presented the report of a case of **Artificial Impregnation and of the Fallibility or Unreliability of X-Ray Pictures in a Gynecological Case.**

In Case I, besides the fact that conception took place immediately after artificial injection of semen into the uterine cavity of a previously sterile woman, the bacteriologic history is typical, in the writer's experience, of a large number of infected cases with a putative gonorrheal history, when the gonococcus has not been found.

CASE II is a glaring example of how easy it is to be influenced by laboratory findings, in spite of the fact that frequently these findings flatly contradict clinical signs and symptoms or, at least, tend to minimize their importance. We all recognize how general this tendency is, and nowhere is it more pronounced than with x-ray pictures. Too many men are convinced of infallibility of Roentgen findings.

CASE I.—Mrs. X, age thirty-one, having been married one year, came to the writer's office in July, 1921, to find out why she had not become pregnant. As a child she had had scarlet fever, measles, and mumps before ten years of age. At fourteen she had jaundice. Ten years ago she had the glands of the neck on the right side removed for persistent swelling. Three years after repeated attacks of tonsillitis, which she had had from childhood, she had a tonsillectomy. Her periods up to five years ago were regular, of the twenty-eight day type, since then they have been every twenty-four days, lasting for from four to five days, with moderate flow and no pain. Bowels regular. In December, 1920, she went one day without passing water. When she did pass it there was considerable pain. This lasted only a few days. In March, 1921, while in Rome, she went over her period six weeks, but flowed not much more than normally after a good deal of active travelling. In June, 1921, period was less in amount and accompanied by severe backache. She passed a large plug of mucoid material just after the flow ceased. During her July period (11th to 15th), which came on time, she had a good deal of burning on micturition. This has continued to the present time, July, 19. She has pain on coitus and has lost twenty-one pounds since December, 1920. Examination showed the uterus acutely anteflexed, and somewhat immobilized. Right tube very tender to touch. Right ovary enlarged. Marked endocervicitis with proliferation. Profuse mucopurulent discharge. Repeated smears from the vulva and cervix showed

many diplococci morphologically the same as the pneumococcus. No gonococci found. Urine, not catheterized, showed a marked trace of albumin, much pus. Husband acknowledges gonorrhea fifteen years ago, with a "slight" attack six years ago.

Treatment consisted of rest in bed most of the time. Tampons of glycerine, hot douches while acute symptoms lasted. The cervix was then treated with twenty-five per cent alcohol injections and intracervical applications of gentian violet, fifty per cent.

On November 30, all pelvic symptoms had entirely disappeared for more than a month. The Carey test for tubal patency was tried. A short while after the patient had gone home, she had a slight pain in the left side which lasted for one and one-half hours. On December 15, one and one-half hours after intercourse, sperma in the vaginal pouch were found inactive, while those in the cervix were active. With a Carey pipette, 1 c.c. of cervical fluid with sperma was injected into the uterine cavity. At this time the cervical condition was very much improved: no erosion or swelling. There was a moderate amount of cervical plug. No coitus after injection. On January 4, 1922, she was nine days overdue and had had some crampy pains. Patient went on normally to full term, giving birth to a 6½ pound baby girl on September 15. The labor was dry and the position O.D.P. Delivery was normal, without tear.

The baby had double talipes varus. On the third day she developed a conjunctivitis in the left eye, although the usual hospital prophylactic instillation of argyrol had been done. This was aborted by hot boric acid lavage. The microörganism was the pneumococcus. Two days later the other eye showed some redness, which subsided under the boric acid treatment. Five days after birth the left breast showed some swelling, which went down after bandaging. Two days later she developed an abscess in the right breast, which was incised. The microörganism was the staphylococcus albus.

The interesting point in this case, from a bacteriologic standpoint, is the presence of the pneumococcus, both in the mother and child. It has been the writer's experience that, in a large majority of chronic cases of cervicitis when there has been exposure to the gonococcus, the pneumococcus, or a microörganism morphologically indentical, has been found. This applies to chronic cases in little girls as well as in adults. The importance of this is, in the writer's opinion, in the treatment; mild antiseptic lavage being preferable to the stronger silver treatments.

CASE II.—In July, 1922, the writer was called to operate upon a supposed case of intestinal obstruction. Before leaving town, he was asked to go to the office of a well-known x-ray specialist and look at the picture which had been taken two days before. The specialist pointed out an obstruction in the jejunum. He was very positive in his diagnosis and urged immediate operation. The family doctor was also convinced of the necessity of surgical intervention, but was not quite so positive. On arriving at the patient's home the following history was given: The woman, thirty-nine years old, had been vomiting for the past ten days; had been unable to retain anything, even fluids. The retching was growing worse every day. The bowels had been moved by enema the day before. There had been no temperature, but the pulse was about 100 to 110. She had two children, 17 and 6 years, and several miscarriages. She had been troubled with constipation since the birth of her first child. In April of this year she had a phagedenic ulceration at the post commissure of the introitus vaginae, which had yielded to silver nitrate and rest in bed.

Examination of the patient showed a flaccid abdomen, no distention and no tumor. Temperature normal and pulse 100. In the pelvis there was a moderate amount of swelling on both sides, with a good deal of pain on palpation. The uterus was

somewhat fixed. The patient's bowels had been moving whenever a laxative or enema had been given.

She was not operated on. Appropriate treatment for the pelvic condition relieved the patient of all symptoms in a few days, and in two weeks she was entirely well and has remained so ever since. Undoubtedly, this was a case of reflex stomach irritation from pelvic inflammation. There was no sign of intestinal obstruction clinically, and only the symptoms of vomiting and the x-ray picture to justify such a diagnosis.

DISCUSSION

DR. W. H. CARY.—I want to emphasize the fact that I am more and more convinced of the importance of endocervicitis as a cause of sterility in the female. There is no question but that a great deal of sterility is due both to the result of infection and to the presence of the thick gelatinous, tenacious plug that we see in these long established cases of infection with hypersecretion of mucus.

DR. O. P. HUMPSTONE presented the report of a case of **Dystocia from Fibrosis Cervicis.**

Mrs. — was admitted to the Methodist Hospital on July 21, 1922, having been referred early in her pregnancy.

She gave the following history: forty-nine years of age, married twenty-seven years, she had had eight children, the oldest twenty-six years old, and the last previous child 10 years ago. Her previous labors had all been difficult and ended in forceps deliveries, none followed by any infection. She had had no miscarriages. She was operated abdominally fourteen years ago and a large ovarian cyst was removed from the right side. Her menstrual life had been entirely normal up to Oct. 12, 1921, when the last menses occurred, and she supposed she had reached the menopause. She consulted her family physician after missing her second period, and he, finding the uterus enlarged, referred her to me. When told she was pregnant she laughed me to scorn, but consented to be kept under observation. Quickening occurred in the middle of February and she was due to be confined July 19, 1922. Her pregnancy was without incident except for the development of an unusually large fetal ovoid. I sent her to the hospital for study because of the overdistention of the uterus from an evident single fetus, without undue fluid, when she had passed her full term of her pregnancy. On her admission, examination showed a well built woman of middle life weighing 160 pounds, 5 feet 8 inches tall, with satisfactory findings of heart and lungs and kidneys and gall bladder but with considerable edema of the lower extremities from intraabdominal pressure. Her pulse and respiration were normal. Her blood pressure was 120/70. Her blood picture normal. Her urine contained a trace of albumin. The fundus measured 40 cm. The head presented at the brim, hard and large, the fetal heart, 124, in the left lower quadrant. The uterine musculature was thick and firm. Rectal examination showed the presenting part above the brim; the cervix 2 cm. dilated, 1½ cm. thick, a firm hard ring high up in the pelvic cavity somewhat fixed. The full significance of these findings did not impress me at the time. She was not in labor.

My impression was a healthy elderly parous woman at term or over, with a somewhat oversized child. I entertained and advised induction of labor at term.

She was given two ounces of castor oil and this was followed in three hours by ten grains of quinine by mouth, and a twentieth of a grain of strychnine by hypodermic. At the end of twenty-four hours she had no further result from these than a thorough purgation and a headache. She was then prepared and taken to the

labor room and without anesthesia was induced to labor by stripping the membranes, introduction of a soft rectal tube into the lower zone of the uterus and the insertion of a No. 3 Voorhees bag into the cervix. At this time I noted the cartilaginous hardness of the senile cervix and feared lest it would not dilate. Note was also made of the inelasticity of the vagina.

She was put back in bed and promptly began to have labor pains which in four hours had become very strong and almost continuous, requiring a sixth of a grain of morphine to ease the suffering. In eight hours the labor pains had entirely died away, the baby's condition was excellent; and the mother weary from the efforts at labor but otherwise in good condition. The cervix was just as before 2½ cm. dilated, 1½ cm. thick like a cartilaginous ring with the Voorhees bag jammed down into it. After twelve hours with no further labor, consideration was given to operative delivery. Dührrsen's incisions with a Schuchardt incision of vagina and perineum were thought of and discarded because of the large baby with hard head and the general rigid condition of the pelvic tissues. Cesarean with immediate hysterectomy was determined upon as offering the best chance to both mother and child. The operation took forty minutes and was complicated by adhesions at the seat of the previous ovarian cyst operation on the right side. The cesarean wound in the uterus was not sutured but packed and an undue amount of blood was lost while getting the clamps properly placed on the right side. The baby, a boy, weighed 9 pounds, 11 ounces, alive and normal, 54 cm. long and in the occipito bregmatic diameter 12 cm, with a biparietal of 10 cm. The patient's pulse at the beginning of the operation was 110 and at the end 135. She left the table in good condition. At the end of two hours her pulse was 110 and regular, of good quality. She was given a hypodermoclysis at once after returning to her bed which was placed in low Clark position, and she was thoroughly morphinized. She continued to improve for seven hours after the operation when she suddenly went into shock and inside of an hour was pulseless, unconscious, and seemed to be approaching dissolution. Her husband's blood had been found to match hers and 490 c.c. were given by the citrate method and worked a miracle. In an hour her pulse could be counted at 152, she had a reactionary temperature of 103.5°. The usual stimulants, hot coffee by rectum, external heat and adrenalin chloride, and complete morphinization, were exhibited. At this time her blood pressure was 100/50 and her color index 1, the red cells 2,692,000, 53 per cent hemoglobin.

Her convalescence was marred on the seventh day by the development of a cystitis which in the light of her marked secondary anemia, resulted in a profound disturbance of the ''pace maker'' of the heart, to quote the internist who saw her, and the practical effect was another collapse and shock. Another transfusion of 300 c.c. of the husband's blood brought as immediate improvement as before and she went on to further uneventful surgical convalescence. The abdominal wound healed by primary union. Examination on discharge 26 days after operation showed a slight exudate in the vault of the vagina. Red cells, 3,696,000; fifty-nine per cent hemoglobin, 8800 leucocytes. Her blood pressure remained abnormally low, 90 over 50. The menopause symptoms were very marked, much more than usual after hysterectomy with bilateral salpingo oophorectomy, but we have seen this often in the presence of severe secondary anemia. Her condition was much improved by the hypodermic use of lutein and iron and arsenic.

The baby left the hospital well with the mother.

Summary: Pregnancy in advanced life; dystocia from senile fibrosis of cervix, failure at attempts at induction, cesarean with hysterectomy, delayed shock, transfusion, prompt reaction, secondary shock from urinary sepsis complicated by the presence of profound anemia, transfusion, normal reaction, profound menopause symptoms in presence of secondary anemia, recovery of mother and child.

Deductions from the experience: 1. Never induce labor in the presence of senile fibrosis of cervix. 2. Always take a few sutures in the uterine incision in cesarean operation if a hysterectomy is to follow to prevent undue bleeding. 3. Menopause symptoms when associated with serious secondary anemia are always more urgent and very satisfactorily controlled by the hypodermic administration of lutein and iron and arsenic.

DISCUSSION

DR. A. M. JUDD.—It would seem to be more logical in a case of this kind to do a hysterectomy first and then a cesarean. It is very easily accomplished and you are not going to kill the child by any such procedure. It has been done in some of my cases.

OBSTETRICAL SOCIETY OF PHILADELPHIA

STATED MEETING, OCTOBER 12TH, 1922

THE PRESIDENT, DR. STEPHEN E. TRACY, IN THE CHAIR

DR. NORMAN L. KNIPE read a paper entitled **Version in the Manner Suggested by Potter, as a Safe, Routine Procedure in Delivery; with a Report of over a Hundred Consecutive Cases without the Death of a Child.**

My purpose in reporting this series of over one hundred cases of version without the death of a child, is simply to add the result of my experience to that obtained by others who have given modern version a fair and unbiased trial.

Version is not a new procedure; neither are most of the many surgical operations we do today without thought of failure. But in the last twenty years these operations, due to our increasing skill in technic and asepsis, have given us favorable results which we were never sure of before.

Is there any reason, therefore, in our refusing to accept the possibility that even such an ancient obstetrical operation as version may be so improved as to give us end results decidedly superior to those of Nature at her best?

If we allowed Nature to have her way, few of us perhaps, would be here to-night. We should certainly not have to worry about the overpopulation of the world a hundred years hence and that always interesting, much-discussed and excitement-producing subject of birth control would cease to have any interest whatever.

I believe that version, modern version, is a safe routine procedure to follow by the skilled obstetrician in nearly all cases of labor. You will not agree with me if you are thinking of version in the clumsy way it was formerly managed. Neither will you agree with me if, putting yourself in a previously antagonistic attitude, you read Potter's book and don't practice the operation.

I might say here that I do not agree with Potter in thinking it is a safe procedure for the physician doing occasional obstetrics to follow, unless he has been carefully taught the method on a large series of cases and then follows it routinely. I say this because although I visited Buffalo and saw Dr. Potter deliver a number of cases, I often found myself in the beginning, forgetting occasionally some of the steps which should be remembered to get good results. Gradually however, I became more confident and expert as the number of cases increased.

Remember that one of the satisfactory things about version is that it does not make the slightest difference what the cephalic presentation may be, the version is always done in the same way and the after coming head may be guided through the desired oblique diameter of the pelvic inlet. The only presentation that is not desirable is that of the breech.

A brief outline of my first hundred cases may be of interest. Left presentations about 60 per cent; right presentations about 30 per cent; one case of twin birth. The presentation of a few of the cases seen in consultation, has been forgotten.

Two cases of shoulder presentation which during pregnancy had been diagnosed as transverse.

Two cases of placenta previa, neither case central in type but both cases bleeding at the onset of labor.

Two cases associated with gonorrhea contracted with the pregnancy, i.e., newly married women becoming pregnant by infected husbands. These two cases had a very satisfactory afebrile convalescence.

There were several cases in which previous labors had been very difficult. One of these cases I delivered safely of the third child. The first two babies had been lost by difficult forceps deliveries.

Another case gave a history of a very difficult forceps delivery with first child. She received a complete tear through the sphincter and was referred to me for a repair. Naturally she looked forward to her second pregnancy with fear and trepidation. Notwithstanding the fact that she was two weeks' overdue and required the insertion of a bag to start labor, her delivery was not difficult. A tear of only three-quarters of an inch in length occurred through the inelastic perineal scar tissue.

In the next series of 100 or even of 50 cases, I might misjudge the relative proportion between the size of the pelvic inlet and the fetal head and attempt version on cases that should have had cesarean sections. But certainly I should make the same mistake by applying forceps; and any case that may be delivered safely by forceps may be delivered by version.

So far I have been fortunate and have had no cases of abnormally large heads or excessively flat pelves to cause trouble.

I have done the Potter version on every case that I could get to in time. If I have found the head so far advanced that the usual damage caused by the hard head digging into and tearing the levator muscle and pelvic floor, had already occurred, I have allowed the head to keep on coming and have tried to preserve, so far as possible, the more unimportant perineum.

I agree most emphatically with Potter, that less damage is caused to the pelvic floor by version than by a head presentation. This I have proved by repeated examinations.

After thoroughly stretching and enlarging the vaginal canal by the proper kind of manipulation, the feet, the legs, the thighs and then the buttocks and body are brought down, dilating the vaginal canal in the same cone-like way that the Voorhees bag dilates the cervix. One does get quite often small tears of the perineum, but I have always thought that these were caused by too much anxiety and haste to end the labor and could have been generally prevented by a calmer and less hasty delivery. But such tears are unimportant compared to the more severe and complicating injuries to the pelvic floor.

In any delivery of a pregnant woman: 1. We wish to deliver the mother safely and leave the birth canal in good condition. 2. We wish to deliver a living and uninjured child. 3. We wish to save the mother as much suffering as possible, and the most logical way to do this is to shorten the time of her labor.

These three things we are able to do by version: 1. We are able to deliver a

living and uninjured child as frequently as may be done in normal deliveries or in deliveries with forceps. 2. We can do so with safety and less injury to the mother. 3. We can save her from the worst of her labor pains and cut the time of her labor in half.

The objections to version as a routine procedure seem to be as follows: 1. It is said to be more dangerous to the child. This I do not believe. 2. That it is more likely to produce septic infection, because the hand is introduced into the vagina and uterus. I have not found this to be true. The temperature charts of version cases seem to be more nearly normal than cephalic cases. And this is due I believe, to the less bruising and tearing and thorough cleansing sustained by the birth canal in performing version. It is my firm belief that practically all of the sapremic temperatures occurring after labor, result from wounds in the birth canal and not from any uterine infection except in a few cases of retained secundines.

Those who are constantly declaiming about the danger of inserting the hand into the uterus, or even examining a case while in labor, seem to forget entirely the various operations in which entrance is made through the vagina not only into the uterus, but into the peritoneal cavity itself. I might mention vaginal hysterectomy and hysterotomy, the interposition operation, etc. It was not more than a few years ago that I listened to a member of this Society advising quite emphatically that every cesarean section which had been previously examined through the vagina, should have the uterus removed. Of course the pendulum has swung backward to more or less sanity and normalcy, but there are obstetricians who are still confused as to the entrances and exits of the body and use the rectum for other than its real purpose.

Finally, I have given version a good trial. I like it and shall continue to use it because the results are better than I have obtained in any other way and I have succeeded in shortening the time of the mother's labor and thereby saved her much suffering.

DISCUSSION

DR. WILLIAM R. NICHOLSON.—It is a matter of great importance that we have a clear and definite idea as to just what we are about to discuss. As I understand the question it resolves itself into whether we are willing to advocate the use of version in uncomplicated normal labor in order to save the woman the experience of the second stage. Put in this way it will be noted that the question of version to meet pathological conditions is not under discussion. Indeed there could be no difference of opinion here as all obstetricians are in accord in believing that version frequently offers the best and in many instances the only method suitable to effect delivery.

It will also be noted that the question as to whether Dr. Potter is acting wisely in conducting his cases according to this plan is not under discussion. In order to clear the way it is only fair to state that Dr. Potter is without doubt the most expert versionist in the world today and that he has done a marked service in standardizing and emphasizing the operation though, after a careful study of his technic as given in his book, I fail to find in his technic anything essentially new. It goes without saying that any normal case can be delivered by version at the end of the first stage. Not only has Dr. Potter proved this, but it has been the common knowledge of the profession for ages.

Now as to the question before us, namely, our sanction of the operation of version in normal cases. This is the real point at issue and we should discuss it with a full realization of our responsibility in the matter. We must realize that we are discussing an obstetrical procedure advocated for normal cases and we must remember that while the ordinary practitioner does not consider himself competent

to do the major gynecological operations, he does feel that his experience in obstetrics has made him perfectly competent to deliver a normal case. If therefore this Society goes on record as advocating version in normal labor to prevent the suffering of the second stage we shall assume a responsibility from which I for one most certainly shrink. Can we honestly say to our fellow practitioners that it is right for them, forsaking the well established means of control of pain and nullifying Nature's mechanism, to routinely convert normal head presentations into those of the breech?

This operation of version is a major obstetrical procedure and for its safe performance, good judgment, aseptic technic and deep anesthesia are prerequisites. I am frankly of the opinion that if this Society should set its seal of approval upon this procedure there will be much time saved in the practice of obstetrics in this locality together with a perfectly unjustifiable loss of fetal and maternal lives.

DR. COLLIN FOULKROD.—If we are discussing the introduction of version in place of normal delivery, and I take it this paper has been presented with this end in view; it seems to me that more than one voice should be raised in this Society to stamp its disapproval upon such an action. If 60 per cent of Dr. Knipe's cases were left sided children the majority of that 60 per cent were L. O. A. and in my experience my L.O.A. deliveries are normal, with perhaps a slight cutting of perineal body. It has been my experience, just as Dr. Potter expressed it, that the record in textbooks regarding right sided babies making only 5 to 10 per cent of the total is inaccurate, that there is a growing increase of right sided children; these make up the biggest bulk of the obstetric operations today and are perhaps the major field for forceps delivery and version. Neither Dr. Knipe nor Dr. Potter have demonstrated to me that they can stretch the vagina with their fingers as well as it can be stretched by the bag of waters, or by the head, nor do I believe that when I stretch the vagina for version none of the muscle fibers give way; the muscle may break even if the mucous membrane is intact. It is far better for us, as pointed out, if we have need for such stretching, to cut. Certainly 60 per cent being first position children would have given good dilatation, but if any one attempts to do a version he must take into consideration the laceration of the upper pelvic canal as well as the lower and it is impossible for them to convince us in eight to ten pound babies, of which we see a certain proportion, that they can do version as well as head presentation. I rather hoped that commendations would be placed upon the improvement Dr. Potter has instituted. Several things are new which have come out, so I believe much can be learned by studying his book and method and much can be learned by way of relieving women of pain.

DR. DANIEL LONGAKER.—I want to say that I agree very fully practically with everything that has been said and I want to congratulate Dr. Knipe particularly upon his brilliant results. He has certainly shown very remarkably good judgment. There is one point, however, in which I cannot agree with Dr. Knipe. If I did not misunderstand him, I think he said that any baby that could be delivered by forceps could also be delivered by version. I must say, if this be true certainly Potter would substantiate it, but he does not. In June, 1921, I spent three days and two nights with Potter. I saw him deliver eleven babies. The last case I saw was certainly worth a trip to Buffalo; more about it later. I would say to Dr. Nicholson, while I agree with what he says and while I would second the word of caution in regard to the general adoption of this method, I believe if he went to Buffalo he would see that there is something totally new there, something of which written accounts give an inadequate idea, an amount of team work and consistency of operating which is new. I have never seen anything, or read anything like it and I am sure Dr. Nicholson will sound a different note after he comes back. To come back to my

story, the last one of Potter's cases proved Dr. Knipe's statement is not correct. This was a patient that ought to have been a very favorable case for version. She was a multipara, actively in labor. Her membranes had not ruptured. Potter after his usual method, worked a few minutes, and I saw him begin to worry, usually he does not. He worked probably thirty seconds longer and taking his hand out and turning to the relative he said, "Doctor, I cannot turn this baby," thereupon he had ready a pair of short forceps and made a very skillful forceps delivery. Now I think this may be accepted as proof that every case cannot, or ought not, be delivered by version. I do not care to state my own results, but I have probably not used as good judgment as has Dr. Knipe. I have had no trouble, I have not gone over all cases; there have been approximately 150. I have turned cases which I should not have turned. There are, I may say, certain women whose expulsive pains come on so rapidly that unless one gets the feet down very promptly he is going to have difficulty. Going back to the early days of this Society, of "version versus forceps:" There is no doubt in my mind, demonstrated by my own work, that you can get a larger baby safer through the pelvis by version than by forceps. The worst lesions inflicted on women were from forceps. That these same cases could be safely delivered by version and without traumatism, is equally true. Probably the increased class of bad cases we see, the cystoceles and rectoceles, are the women who have had a large number of children unaided. There is another way of proving whether version makes fascial and muscle tears and that is to examine the patients afterwards. Examine your cases after a month and two months and I am sure you will be delighted with the results. I am convinced by my own examinations that many of these women present healthy intact canals, practically virginal; the same cannot be said of forceps.

DR. GEORGE M. BOYD.—This Society had the pleasure of hearing a paper on version by Dr. Potter of Buffalo about a year ago. I then stated that I believe in the use of version for the usual indications, hemorrhage or faulty position of the fetus but do not approve of its routine use for the purpose of eliminating the second stage of labor. Sometimes version is of value when the forceps fail. I believe the time element in labor is very important. This method of accouchement forcé not only interferes with nature's physiology of labor but may be unnecessary and harmful. By performing version for the purpose of shortening the second stage of labor, you add much work to the obstetrician, for every case is made an operation and you relieve the patient only of the second stage pains. In a review of 10642 deliveries at the Philadelphia Lying-in Charity, I found that in nine cases out of ten, labor was spontaneous and that our conservative method of delivery gave a satisfactory fetal and maternal mortality. Only in one case out of ten was some manual or instrumental assistance necessary.

DR. EDWARD A. SCHUMANN.—I think the discussion has been diverted more or less into the matter of the technic of operative delivery. The real question is whether or not the profession cares to accept the challenge which was flung to them almost simultaneously by Dr. De Lee of Chicago, and Dr. Potter of Buffalo, that every obstetrical case should be terminated by operative means. Shall we endorse the method of Potter by version, that of De Lee with his prophylactic forceps and formidable episiotomy or shall we insist that normal labors be allowed to terminate spontaneously. Of the two operative procedures I am strongly in favor of Potter's method, but I wish to emphasize here my very strong opposition to the termination of normal labor by any operative interference whatever.

DR. ALICE WELD TALLANT.—I feel, with Dr. Nicholson, that in laying so much stress on shortening of labor, when it only shortens the second stage, Dr. Potter makes a great mistake. I tried to speak of that when he was here. I agree with

Dr. Nicholson that the first stage is the time when patients suffer the most. During the second stage the pain is comparatively short. As to performing version in every patient in second stage it does not seem reasonable. Dr. Knipe is to be congratulated on having shown better results in fetal mortality than Dr. Potter.

DR. J. STUART LAWRANCE.—One of my reasons for being opposed to Potter's indications for version is a fear of entering the vagina. I think that I have some grounds for this fear when I look back over the records of St. Mary's for the past year. The service there consists of three classes; First, clinic;—Second, emergency;—Third, cases we call non-service (not delivered by the obstetrical staff). The clinical cases are conducted without any vaginal examinations at all. Rectal examinations are used entirely. The emergency cases come to us after having a great many vaginal examinations, and sometimes attempted operations. Our morbidity standard is based on that of Rotunda Hospital, of Dublin; i.e., Tempt. above 99° thrice, and pulse above 90. For the past year I find the morbidity of the clinic cases is 7.25 per cent; while that of the emergency cases is 21 per cent. Although this is a small number of cases; i.e., 295, these figures indicate that there is some danger in needlessly entering the vagina. I advocate version if the classical indications are present, but not as a routine. In 1919 out of 243 labors from 7 to 10 lunar months, there were four versions; maternal mortality 0; infantile mortality four. In 1920 out of 302 labors from 7 to 10 lunar months there were seven versions with an infantile mortality of four, and maternal mortality of one. In the year 1921 out of 262 labors there were 16 versions one infant dying; maternal mortality 0.

DR. CHARLES S. BARNES.—I was very much interested in the reference Dr. Longaker made to the failure in accomplishing version in one case of Dr. Potter's. I am impelled to ask why he did not succeed. Was the head too far down? I did not know he ever admitted failure, except in that case. I perhaps use version more often than I used to do, although I have always used it a good deal. Frequently in cases in which formerly high forceps were supposed to be indicated, I succeed much better in doing version. I have had a series of cases in the past months in which there was moderate flattening of the pelvis, in some of which the head was fixed, in which I contemplated forceps but in a number of them did version and extraction.

DR. LIDA STEWART COGILL.—Dr. Knipe should be congratulated for presenting a topic upon which there is such a difference of opinion. Tonight we are talking about *routine* version in *all* cases, I would ask does he mean that our students and internes shall be taught that *routine version* should be done in *every* case? I would like to ask what form of anesthesia he uses, the length of time it takes to ''iron'' out the vagina, and the perineum and if he will state the number of cases of maternal mortality, as reported by Dr. Potter.

I heartily agree with Drs. Schumann and Nicholson, in the cases I have heard of recently where sepsis followed routine version, colon bacillus was given as the cause of infection. Is it not likely we will frequently have that form of infection if long manipulation of the parts, due to ironing out the vagina, is practiced? In Dr. Knipe's case he brought out that he had noticed early that the patient had a very foul rectal discharge. Would not that really have been a contraindication for version?

DR. KNIPE (closing).—The Potter version differs from the ordinary version and there is as much distinction between Potter version and ordinary version as there is between old methods of operating and present-day methods. Potter irons out the vaginal canal for about ten minutes because he wants to get results; that

result is thorough stretching of the levator ani muscle. Dr. Foulkrod said I spoke continually of the more unimportant perineum and vaginal floor; when the head comes down it digs into the pelvic floor and it dilates by tearing. The pelvic structures above I continually emphasized as being the most important in the whole vagina. Now as to advising routine version for the general practitioner, I state in my paper I do not. I said that modern version ought to be taught in our medical schools to students so they will have a chance to use it. I believe it is just as logical to do version routinely as it is to do anything else routinely where we think it is an improvement on what we have had before. We do cesarean section on certain cases. I think we have just as much right to emphasize this version as cesarean section. Now we do section with impunity and we have a right to do it. Dr. Tallant mentioned the length of the first stage and the shortness of second stage. What is the first stage of labor? The first stage of labor is up to complete dilatation of the os. What is the period of labor between complete dilatation of the os and time it begins to come from pelvic outlet? It has no name. I have seen and you have seen a head being pounded for hours, long after the os dilated. Then is the time to do version at full dilatation of the os and save the woman a great deal of pain. In answer to Dr. Cogill: I have always used chloroform, as a rule Potter does. I have never had bad results with chloroform anesthesia in confinement. It takes about ten minutes to iron out the pelvic floor. I do not remember what Dr. Potter said about maternal mortality. I had one case of maternal mortality and I think Dr. Cogill is right, if I had noted the odor I possibly would not have done a version for fear of contaminating, but it was not until I started to manipulate that this material was squeezed out and then I went ahead with the version.

Dr. Collin Foulkrod reported two cases of **Encephalitis Complicating Pregnancy** and a case of **Acute Anterior Poliomyelitis Complicating Pregnancy.**

The recognition of encephalitis is of recent origin.

The reaction of pregnant women during such complications has proven, in our experience, to be of such importance that we think it best to place on record the history of those cases which have occurred in the service of the Presbyterian Hospital.

It is of general importance to note that in both of these cases the patient showed convulsive twitching. This twitching was mistaken by the general practitioner for eclamptic convulsions and the patient was sent in as an eclamptic.

Our suspicion was first aroused by the low blood pressure and absence of urinary irritation in one case and in the other it was extremely difficult to differentiate between the two because at times there was a cloud of albumin and the pulse tension did rise to 160 systolic in the middle of the disease.

Labor in these cases assumes the same type as is seen in other acute infections. Relaxation of the cervix, a flaccid uterus and yet a normal delivery. There was no marked hemorrhage after delivery. The patients were shocked afterward and in the seriously ill case immediate death occurred. In the other one; death from complications at a later date.

In the one with cord involvement the patient lived but the baby apparently died *in utero.*

The prognosis is as serious as that of the complicating diseases and while I think that labor may be a factor in the death of some patients, still I think that they were so ill they would have died anyhow.

CASE I.—Mrs. A. S., admitted to hospital with the history of having had influenza two weeks previous and having been ill for a week after being admitted. Her temperature was normal, pulse tension 130 systolic, urine scanty and showed a large trace of albumen and granular casts.

She was placed on eliminative treatment and at the end of twenty-four hours pulse tension dropped. At the end of forty-eight hours her pulse tension was 160. She was semiconscious and delirious. On examination cervix found to be one-third open, membranes pouching and head in the pelvis. Membranes ruptured and living child about twenty-eight weeks (female) born.

Patient then continued in about the same condition with irregular nervous twitching over all the body, pain in abdomen, ptosis, palsy in area of third nerve. Some irregular muscle twitching. Pupils somewhat fixed. On the fourth day she developed a paralysis of the left side, the arm first and then the foot, accompanied by stertorous breathing. The case was diagnosed as epidemic encephalitis. Hemoglobin eighty-nine per cent. Leucocytes sixteen thousand, red cells four million eight hundred. The urine increased in quantity until she was passing seventy-five ounces per day. Very faint albumin, no casts except a few hyaline at one time.

On Feb. 29, 1920 she complained of seeing double, no headache preceded, only indigestion and some backache. At noon the same day she developed high fever. On Mar. 2, 1920 she was irrational, wanting to get up out of bed. There was twitching of the muscle and she was still seeing double.

On Mar. 11, 1920, Mrs. S. had a convulsion at 1:15 P.M. with which she vomited green liquid. After a venesection, she was given a hypodermoclysis of 700 c.c. N. ss she seemed less stupid, was exceedingly restless. By midnight she was aroused with difficulty and there was almost constant twitching and moaning. After morphine at 1:15 A. M. the patient was quieter. Toward morning her speech grew thick and muttering. The puffiness of the face had increased. Since midnight she had taken some milk and water.

On Mar. 15, 1920, she was unable to use the left arm and puffing out side of mouth, the following day was unable to use left leg. There was a weakness of the third nerve supply on each side as shown by bilat. ptosis and there is also some disability in the ocular rotation. The tendon reflexes of the lower limb are slightly diminished. There can be no doubt as to the diagnosis.

On Mar. 18, 1920, lethargy deeper, can be aroused with effort. Respiration shallow, rapid, involuntary movement of trunk, neck and limbs more constant but not violent, rigidity of neck muscles, appears fatally ill. Wassermann negative.

Summary of Autopsy Findings—Brain, moderate edema of parietal lobes. Marked perivascular round cell infiltration most marked around the foramen of Sylvius and in the cervical cord.

Heart: cloudy swelling and dilatation. Lungs, atelectasis of right lower lobe. Kidneys, diffuse miliary abscesses. Liver, cloudy swelling. Left ovary: dermoid cyst 15.5 x 15 x 8.5 cm. The dermoid cyst the size of a grape fruit over the left ovary pushed up by the pregnancy until it was under the liver on the right side and pushing the liver and diaphragm up sufficient to cause atelectasia. Uterus slightly larger than normal.

CASE II.—Mrs. M. P., admitted April 18, 1922. Last period ended on August 6, 1921. Patient was perfectly well until two weeks ago, general malaise then appearing. Six days prior to admission she began to have gastrointestinal upsets in which she would have distention from gas, sour eructation and vomiting. Five days previous to admission, patient began to notice blurring of vision. This gradually became worse and she became alarmed about it. On April 16, patient was taken with a very severe pain at the upper end of the left arm which radiated into the shoulder and down into the region of the heart. Pain had been continu-

ous since then to date of admission. It was impossible to control this pain in any way except by narcotics. No convulsions. No edema. Has varicose veins on the right foot. Bowels moved this morning. One bottle of citrate of magnesia during the last twelve hours. Has had no vomiting. On admission patient is quite rational and cooperative and appears normal. B.P., 104 systolic, 66 diastolic.

The tongue is coated, there is tremor and some ptosis right eyelid. Abdomen size eight lunar months pregnancy. The diplopia, lateral and upward nystagmus, mental confusion, slight temperature and absence of signs of cord disease suggest encephalitis.

Patient was transferred from the maternity to the medical ward, having been admitted to the maternity with possible diagnosis of late toxemia of pregnancy. However there was no elevation of blood pressure, no albuminuria, no headache or convulsions, so toxemia was ruled out. While she was in the maternity she became very irrational and got out of bed, showing signs of mental derangement.

On April 19, she began to have twitching of various muscles of the body which were mostly noticeable in the hands and feet. They were of fibrillatory type. On April 20 her condition became much more critical. There was nystagmus of eyes with twitching of muscles over left eye and left cheek and she had very marked jerky movements of both hands and arms and also both feet. Delirious condition became more severe, so she was transferred to the medical ward with diagnosis of encephalitis.

April 20, 1922, nasal examination: Usual crusting accompanying high temperature. No pus in nose or throat. Small tonsils. Normal ears.

Physical Examination. Patient is very irrational, tosses around in bed and shows few abrasions on both lower extremities from such actions. On inspection one can notice twitching of the muscles of the forehead and face; those surrounding mouth almost constant. More marked on left side. There are jerky choreiform movements in both hands which are intermittent. There are similar choreiform movement of both feet. Patient has slight blurring of vision. The pupils are not dilated. React to light and accommodation.

Teeth in very poor condition. Several roots of old teeth and several capped teeth which are probably infected, and marked pyorrhea. Tonsils not enlarged. Tongue very heavily coated and breath quite foul.

There is a marked rounding and protrusion of the abdomen. There is a scar about four inches long in lower right quadrant from previous operation for appendicitis. On palpation, the fundus of the uterus is found to extend to the ensiform. Fetal heart sounds are heard to the right of the umbilicus and below. No fetal movement can be detected.

There are numerous abrasions and several contusions. One large one on the right foot in the region of the internal malleolus. The deep reflexes are all present, equal and normal on both sides. There is no Kernig's sign. No clonus or Babinski. Tentative diagnosis: 1. Chorea with cerebral symptoms, 2. Encephalitis, 3. Pregnancy.

On account of her rapid deterioration she was transferred back to the maternity ward for induction of labor. Membranes were ruptured artificially at 11 A. M. Cervix about two fingers' dilatation. Head well down in pelvis. Patient began having pains about two hours later and delivered herself spontaneously at 3 P.M. Uterus contracted well. No bleeding. Child was well formed, vigorous and weighed six pounds.

Patient's condition after delivery did not improve. The twitching became more intermittent, minor convulsive attacks in which the right arm is mostly involved with the left side of the face. Patient is conscious, knows what is said to her but is unable to speak very distinctly. Has difficulty in swallowing.

The following day the convulsive movements are more severe. Has greater difficulty in swallowing. Pulse and respiration are still good.

Examined by Dr. Cadwalader, who believed the case a so-called myoclonic form of epidemic encephalitis.

About two o'clock this afternoon the patient became very cyanosed, pulse rate jumped to 160 per minute, respirations were difficult and shallow. This attack lasted for about ten minutes and then subsided. An hour later the pulse rate went down as low as 70 per minute. Respiration became increasingly difficult and lungs began to fill with mucus. Patient had two or three general convulsive attacks which lasted fifteen seconds to thirty seconds. Patient died at 5:50 A.M. due to respiratory failure.

Summary of Autopsy Findings: Brain: Large area of softening involving the left internal capsule, lenticular nucleus and the thalamus. Marked perivascular round cell infiltration most marked in the brain stem and cervical cord. Heart: Cloudy swelling. Chronic interstitial myocarditis. Lungs: Passive congestion. Edema. Marginal emphysema. Kidneys: Cloudy swelling. Low grade hydronephrosis of right. Liver: Cloudy swelling. Slpeen: Passive congestion. Left Sphenoid: Chronic suppurative inflammation, streptococcus viridans. Cause of death: Encephalitis lethargica.

CASE III.—Mrs. R. H., white. Admitted Sept. 29, 1921 to the maternity ward of the Presbyterian Hospital with paralysis of both lower extremities.

Patient states that on the night of September 15, 1921 she awoke with the sensation of pins and needles in the entire lower right limb. After massage of part by husband, patient went to sleep again. Felt nothing more unusual until the following Saturday (Sept. 17). On that night awoke about 11 P. M. with sensation of pins and needles in entire both lower extremities, with a rather severe aching pain in right limb, especially about the knee. On attempting to move the right lower limb found that it was almost entirely paralyzed, being able to move it but little. There was practically entire loss of sensation of right limb at first, followed later by a similar loss of sensation of left limb. On Saturday evening, September 17 about 7 P.M. patient's arms and limbs began to jerk forcibly at irregular intervals. On Thursday, September 22, the left lower limb became very weak, so that the patient could put no weight on it, and she had to go to bed. Condition gradually became worse until time the patient was admitted to the hospital. On admission patient had a very slight motion in lower extremity and none at all in lower right extremity with practically no sensation in either one. Clonic spasms of the extremities continued up until time of admission. After admission these spasmodic movements continued to a lesser degree and only in the lower extremities. On September 21, patient became incontinent of both urine and feces. No headache or dizziness. No blurring of vision. No cough. No dyspnea. Some swelling of right limb. No pains in region of heart. No palpitation. Appetite good. No gaseous or sour eructations. Never constipated; bowels too loose.

Previous history of measles, mumps and chicken-pox. Influenza in the fall of 1918. Tonsillitis.

Menses at 13, regular every twenty-eight days up until marriage, duration five to six days. Normal in amount. Last period January 15, 1921. Expected confinement, October 22, 1921. Two former pregnancies, resulting in living healthy full-time babies. No miscarriages.

Under date of October 4 it is noticed that there is complete motor paralysis of right lower limb, and she cannot feel pinpoint touch anywhere, or deep pressure, or passive movement on the right side up to the level of crest of the ilium where there is a sharp line of demarcation anteriorly. The left lower limb is not completely paralyzed, motor power is distinct, but very feeble. Sensation for rec-

ognition for movement of position is normal, but for touch and pinpoint it is severely affected but not completely lost. It is found as high as lower third of thigh.

The patellar and Achilles reflexes on each side are slightly exaggerated but equal. There is no clonus. Cranial nerves, upper limb and abdomen, etc., are normal. Condition seems to be improving slightly and symptoms have probably reached their height.

Diagnosis.—Acute infectious myelitis, nature uncertain but probably poliomyelitis. Spinal fluid should show an increase in mononuclear cells.

Probability is that if damage is done to fetus, it was done before admission and will probably not be affected. Condition seems improving and does not indicate terminating pregnancy.

On October 11th, Dr. Cadwalader advised lumbar puncture for the removal of fluid for laboratory examination.

On October 16, the fetal heart sounds became weak and slow and movements less. A soft rubber bougie and water bag were inserted to induce labor.

October 18 at 12:40 P. M. the patient gave birth to a stillborn baby which an autopsy found to be normal in every respect.

Nine days after delivery there was a decided rise in temperature and the right leg became sore and stiff; the right knee hot and tender. A mass can be felt in the popliteal space, probably a phlebitis, which completely subsided in a few days.

Was discharged still partially paralyzed but sitting up. Although the case was not seen, at a later date the attending physician reported a complete but slow recovery of both sensation and motion.

There were no eye ground changes whatever.

The laboratory report on placenta disclosed the most striking features to be a fairly marked fibrosis of the villi and rather marked endarteritis obliterans. The connective tissue in some places shows hyalinization. There is no perivascular round cell infiltration. Here and there small areas show slight calcareous infiltration. Treponema pallida not demonstrated in preparation stained by Levaditi's method.

DISCUSSION

DR. WILLIAMS B. CADWALADER.—Since the epidemic of influenza in 1918 there have been many cases of lethargic encephalitis observed in this country and in Europe. The relation of lethargic encephalitis to influenza is not proved. Circumstantial evidence, however, seems to indicate very strongly that there is a close connection. Wernicke's polioencephalitis, known for many years, is probably a form of lethargic encephalitis. Lethargic or epidemic encephalitis is now regarded as an infectious disease. A specific organism has not been isolated with certainty. However, it is believed to be transmitted to the brain from the nasopharynx by the blood stream, or more likely by way of the lymphatics within the cranial nerves.

In the differential diagnosis there are many other conditions that can cause confusion especially during pregnancy: namely, uremia, cerebral embolism, meningitis, and even typhoid fever. The occurrence of lethargic encephalitis during pregnancy is not remarkable.

There is no evidence to show that pregnancy, in itself, either increases or decreases the susceptibility to contract lethargic encephalitis while an epidemic is raging.

DR. JOHN EIMAN.—I want to emphasize what Dr. Foulkrod brought out, the infected sphenoidal sinus in one of these cases and the acute pyogenic infection in another case. I have autopsied six or seven cases of encephalitis and in every one

of them there has been definite infection of sinuses or middle ears. The work of Straus deserves careful consideration, but at the same time, I think, it is wise we should bear in mind the other infections. They may have some other bearing on this interesting condition.

DR. GEORGE M. LAWS.—I have brought the notes of a case that may be added to this group of neurologic lesions associated with pregnancy. A young woman, perfectly well until she had influenza in 1918 but never quite well afterward, became pregnant early in 1920, suffered from exaggerated vomiting until she lost 40 pounds, became extremely ill and developed polyneuritis. She came to the Presbyterian Hospital when about five months' pregnant. Dr. Foulkrod saw her with me and concurred in advising immediate therapeutic abortion. This was induced and the next day she was delivered spontaneously of a macerated fetus. The notes show that there was not much change in her condition during the next ten days. She had bilateral wrist drop and complete paralysis with loss of tendon reflexes below the knees. The temperature averaged about 99.5°. Then she had repeated chills and high, irregular fever for several days. The pelvic organs seemed perfectly normal. Dr. Joseph Sailer, in consultation, expressed the opinion that she had a streptococcic infection, possibly latent from the time of the influenza, then lighting up with the resultant polyneuritis. At his suggestion antistreptococcic serum was given in large doses though the blood culture was negative. After six weeks she was able to go home and has continued to improve so that she can now use her hands fairly well and can walk without a cane. The points I should like to have cleared up are, the relation of the streptococcic infection to the toxemia and to the neuritis, and its relation, if any, to the influenza, and whether we were correct in so diagnosing it.

DR. PHILIP F. WILLIAMS read a paper entitled **Glycosuria Test for Pregnancy**. (For original article see April issue.)

Department of Reviews and Abstracts

Selected Abstracts

Radiotherapy

Proust, R., and Mallet, L.: **Indications for Hysterectomy, Radiumtherapy, and Penetrating Radiotherapy in Cancer of the Cervix of the Uterus.** La Présse Médicale, 1922, ix, 89.

From the point of view of the end results the radical abdominal operation and the extended perineovaginal operations of Schuchardt and of Schauta give about the same percentage of cures. Thus, statistics published by Wertheim, Bumm, and Schauta give 40 or more permanent cures per 100 cases. But these figures are based upon very early diagnoses. If all published statistics are studied, we find that permanent (five year) cures are obtained in scarcely more than 30 per cent of the cases surviving the operation. There are more cases of permanent cures than of rapid recurrences, if the excision of tissue be sufficiently radical. The authors conclude that, when the indications are well placed, radical operation is justified if the end results are considered, but the primary mortality is by no means negligible.

Dominici has standardized the use of filters in radium work, thus making possible the use of the ultra-penetrating gamma rays, with the duration of the application prolonged and with deep treatment of tumors possible, while at the same time the healthy tissues are spared. A popular French method of treating cancer of the cervix with radium is as follows: A dose of a radium salt, corresponding to 30 or 40 mg. of the element, or an equivalent dose of the emanation, is placed in the uterus with a primary filter of 1 mm. of platinum and a secondary filter of a thin leaf of aluminum covered with black rubber. A similar dose, filtered with 1½ mm. of platinum and a secondary filter, is placed in two layers on the level of the two vaginal culdesacs. Ragaud and his co-workers have devised an apparatus for this treatment called the colpostat. The tubes are left in place for a period of time which depends upon their strength, but the treatment can be extended over three or four days. Each day the tubes are removed, the vaginal and uterine cavities washed out, and the tubes replaced.

It has been calculated that, if 40 mg. of radium element are used for 100 hours (4000 mg. hours) 30 millicuries of emanation will be destroyed. The usual dose is a little larger, with 40 to 45 millicuries destroyed, corresponding to 5000 or 6000 mg. hours. This is generally obtained by employing 30 mg. in the uterus and 30 in the vagina, which dose should not be exceeded. Tubes of emanation may be used, but as the radioactivity of the emanation diminishes by one-half in four days, a larger initial dose would be necessary; this rapid loss of strength would entail a less efficacious biologic result, hence a salt of radium is preferable.

From the available statistics, they conclude that we can obtain by radium therapy the cure of cancers, still somewhat circumscribed. However, though the uterovaginal application of radium causes the rapid disappearance of vegetative growths of the cervix, permanent (5 year) cures are less frequent than after operation. Taussig,

in a critical review, reported a total of 224 five-year cures out of 1114 collected cases, or 20 per cent. The failure to secure a larger number of permanent cures seems to be due to the insufficient radiation of the parametrium, the results obtained being comparable to those secured by the old operation of limited hysterectomy. Hence, some workers, including the authors, have been led to the implantation of radium in the broad ligaments; the "radium Wertheim" or the "radiotherapeutic drainage of the true pelvis" of Frans Daels.

The employment of x-rays in the treatment of the uterus was not practicable until apparatus was developed by which a sufficiently efficacious dose could be delivered through the abdominal wall to the deep tissues, with rays so hard that they were not absorbed at the surface. With apparatus employing a tension of 200,000 volts, with a 40 cm. spark gap, one obtains rays the hardest of which have a wave-length of 0.1 or 0.2 units Angström. A filtration of 12 mm. of aluminum or of ½ mm. of copper with 2 mm. of aluminum (to arrest the secondary copper rays) eliminates the rays of longer wave-lengths and furnishes radiation which is at the same time penetrating and homogeneous. The weakening of the radiation in the deep tissues is less than one would think, if large fields of irradiation are employed. A cancer of the cervix at a depth of 10 cm. will receive 30 or 40 per cent of the dose received by the superficial tissues, hence the necessity of employing five or six portals of entry, each receiving a dose slightly below the erythema dose, in order to deliver, by this cross-fire, a sufficient quantity of the rays. In order to determine exactly the points of attack and the direction to give to the rays, an exact localization of the tumor must be made, and for the uterine cervix in particular great accuracy is indispensable in order to obtain satisfactory therapeutic results. Seitz and his co-workers deliver the necessary dose in a single sitting, using six portals of entry, and treating through each for forty minutes. This technic is applicable only in selected cases and liberates a massive dose of toxins, causing at times a "radiation sickness," a form of shock which may be very grave. In order to spare the skin and especially to allow for the restoration of the blood corpuscles, the treatment should be spread over a period of six weeks, but thus precious time would be lost, therefore Ledoux-Lebard and others employ an intermediate method, the whole treatment not surpassing a week.

By this method, the following results are obtained (Béclère, Jour. de Radiologie, Jan., 1921): operable cases 60 per cent cures; inoperable cases 23 per cent cures; 5-year cures, 20 per cent. This is a favorable showing, considering that the cases are unselected.

In determining the relative indications for these three methods of treatment, the authors classify cervical cancer as follows: (1) Early cases, organs freely movable; (2) Cases still operable, but with some parametrial invasion; (3) Cases which are inoperable but with general condition good; (4) Very advanced cases, general condition bad. All patients are examined with cystoscope and proctoscope. Patients in the first class should be treated by radical operation, which may be advantageously preceded (2 or 3 weeks) by a vaginal application of radium. At least a month postoperatively, the broad ligaments should be treated with penetrating x-rays in order to kill any cancer cells which may have been implanted in the pelvic tissues. In the second class of cases, best results are obtained either by a "radium-Wertheim" treatment, or by supplementing the uterovaginal radium treatment with an immediate deep radiation of the parametrium by x-rays.

In the third class (cases with marked infiltration), there is a strong possibility that fistulae will follow the use of radium, so chief reliance should be placed on deep x-ray treatment, radium being at times employed as a supplementary agent, usually applied vaginally, at times in the uterine cavity or intraabdominally.

In the fourth class, the x-rays are also preferable, purely as a palliative measure,

employing small doses in order to avoid overwhelming the weakened system with toxins.

We should bear in mind that operation is immediate in its action, that radium acts rapidly (about 15 days), and that penetrating x-rays act more slowly (about six weeks). Furthermore, in ''radioresistant'' tumors, we should extend our indications for operation.

To supplement operative treatment, radium should be used before operation (but not more than three weeks before), and penetrating x-rays after operation. In resorting to radiation alone, the best result is usually obtained by the combined treatment.   E. L. KING.

Burrows, Arthur: The Problem of the Radium Therapy of Cancer. The British Medical Journal, July 8, 1922, No. 3210, p. 33.

The author emphasizes the importance of considering the difference in the lethal doses of the beta and the gamma rays. In determining the amount of radiation to be given in a case, it is necessary to determine the dosage of a certain type of ray as well as the size, nature, and position of the growth. The locality of the tumor alters the type of ray and the dosage to be used. The nature of the tumor calls for different rays and different dosage. The size and density of the tumor is important from a number of different points of view. The method of cross-fire, as recommended by Wickham and Degrais, is important in larger tumors. The position of the tumor must be carefully considered. Of the cases treated by them, mostly inoperable, 7½ per cent of all cancer cases are alive and well after periods varying from two to seven years. There are other beneficial results from radium treatment aside from the actual cure of cancer. Much palliative work is done. In non-malignant conditions, such as exophthalmic goiter, Hodgkin's disease, keloid, nevi, and uterine hemorrhage, the percentage of cures is very high.   F. L. ADAIR.

Monod, Robert, and Monod, Octave: The Treatment of Cervico-Uterine Cancer by Hysterectomy Following Radiotherapy. Présse Médicale, Feb. 11, 1922, p. 113.

The authors report two cases of fairly well advanced cervical carcinoma treated in this manner. The first patient was treated with radium emanation over a period of thirteen days, with entire disappearance of the cervicovaginal mass and a marked diminution of the infiltration of the left broad ligament; the right had not become involved. Radical operation was performed without difficulty twenty-seven days after the last radium treatment. No sign of recurrence was demonstrable when examined eleven months later. The second patient was treated with radium emanation also, over a period of several days, with a total of 96 hours of treatment. Operation was performed two months after the first radium treatment, and so much dense connective tissue was encountered that it was necessary first to perform a supervaginal hysterectomy and then to complete the operation by removing the cervix and the upper portion of the vagina. Examination several months later showed the local condition to be very satisfactory.

Many writers advocate preliminary radiotherapy followed by operation, claiming that there is less chance of recurrence and that the operative risk is reduced by the elimination of the danger of sepsis and peritonitis traceable to the infected, sloughing, cancerous cervix. Two main objections to this method have been advanced: (1) that radium causes a dense connective tissue proliferation which makes radical operation difficult or impossible; (2) that several cases of death following operation have been reported which are explicable only on the ground that there was present a toxemia due to the effects of radium on the tissues. The first objection can be

met by employing proper dosage and correct filtration; the second by allowing a sufficient interval of time between the radium treatment and the operation.

E. L. KING.

Barcat: Radiumtherapy in Uterine Cancer. Le Progrès Médical, June 18, 1921, p. 290.

In a rather technical article dealing with the treatment of carcinoma of the uterus by radium, the author describes fully the technic of the various forms of radium application. He concludes that the best results are obtained by large amounts of radium over a short period of time, his choice being about 6000 milligram-hours obtained with six to twelve cgrs. of radium. The smallest effectual dose he places at about five cgrs. of radium applied over a period of 36 hours.

Barcat advocates the use of radium prior to and following any surgical treatment, and also states that radium is of great value in inoperable cases, sometimes as a curative, but more often as a palliative measure. THEODORE W. ADAMS.

Mayer: Experience with Radiation for Cervical Cancer and Subsequent Operation. Zentralblatt für Gynäkologie, 1922, xlvi, 1599.

Mayer has noted a marked decrease in the death rate from peritonitis following operation in patients who had previously been radiated; also an increase from 50 to 65 per cent in the operability. There furthermore is a decrease in bleeding and irritation by which the patients become better equipped for operation. So far it is too early to speak of ultimate results. H. M. LITTLE.

Frank: The Treatment of Cancer of the Uterus with Radium. Southern Medical Journal, 1922, xv, 489.

The author although a surgeon with his surgical prejudices concludes: (1) Cancer of the uterine body treated by total ablation of tubes, ovaries and uterus yields curative results which we cannot hope to surpass by any other form of treatment. (2) In early carcinoma cervicitis, although radical operation continues a justifiable procedure in the hands of the best operators, equally good, if not better, results, considering the primary mortality, are obtained by radium treatment. (3) All borderline cases should be treated with radium. (4) Late cases may be improved and palliated by radium as by no other means at our command. (5) If the five-year period of curability is to be accepted as indicating a cure, then the results of radium treatment surpass by far those obtained by the profession at large in the treatment of cancer of the cervix by surgical means. W. K. FOSTER.

Burrows: The Treatment of Advanced Carcinoma of the Cervix of the Uterus by Radium. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxix, 97.

The author gives in detail his method of applying radium to malignant conditions of the pelvis. Occasionally there is no benefit to be derived from treating extreme cases. Radium has little effect in the following types of cases: large hard growths, extensive infiltrations of the vaginal wall and in tumors metastasizing rapidly. The best results are obtained in the absence of secondary growths, in tumors with good blood supply and where some uterine mobility still remains. Growths adherent to the bladder and rectum predispose to fistula after radiation. Sections of the cervix removed some time after radiation show dense connective tissue scattered through which may be found degenerated cancer cells.

In analyzing 100 inoperable cases of cervical cancer he found 30 per cent alive

one year after radiation and 12 per cent alive at the end of three or four years. Adding to this the cases made operable by radium the author is led to believe that the therapeutic outlook of cervical cancer is hopeful and the use of radium well worth while for its palliative powers.   H. W. SHUTTER.

Stone: The Present Position of Radium in the Study and Treatment of Uterine Cancer. Surgery, Gynecology and Obstetrics, 1921, xxxii, 509.

While realizing that certain types of cancer are more successfully treated by radium than others, Stone is not yet ready to make any direct practical deductions from this fact. His position as regards the application of radium in preference to operation is about as follows:

Radium, in all recurrences, while less effective than in primary lesions, produces immeasurably better results than operation. For all cases of primary uterine cancer, with few exceptions, radium should be regarded as the method of choice. The partial removal of cancer masses preceding radiation is not to be advised. Whether the preoperative application of radium is of any benefit, has not been proved. In large cauliflower growths, the cautery is of benefit. The subsequent application of radium may increase the permanency of the result, but more often causes extensive sloughing and, thereby, hastens the end. Its use in far advanced cases is to be avoided. (It is in this class of cases that the acetone treatment still gives best results. R. E. W.)   R. E. WOBUS.

Clark and Keene: Irradiation in Cancer of the Female Genito-Urinary Organs. Journal American Medical Association, 1921, lxxvii, 613.

Clarke and Keene use as a standard dose, 100 milligrams of radium applied for 24 hours. This dose is repeated after six weeks if there has been no marked retrogression. A third dose is considered not only useless but harmful. In carcinoma of the cervix, one-half the dose is inserted into the uterine canal, the other half against the cervix. Following the suggestion of Barnham, they have discarded all metal protectors and prevent injury to the rectum and bladder by packing the vagina with a voluminous gauze pack which pushes these organs aside. By this method they have markedly decreased the incidence of fistulae. In some cases the growth is excised by means of the cautery before radiation. They warn against radiation in far advanced cases.

In cancer of the fundus, they incline towards operation, even in well advanced cases. They consider hysterectomy after radiation in any case as unnecessary and hazardous. Of 313 cases of carcinoma of the uterus and cervix treated by radium, 112 are alive after periods of from one to seven years. Of these, 13 have survived over five years. Of 26 cases of carcinoma of the vagina, urethra and bladder, seven are alive after various periods of time.   R. E. WOBUS.

Sweetser: Radium vs. Surgery in Gynecology. Journal Lancet, 1921, xli, No. 24, p. 637.

Of the one hundred thousand deaths in the U. S. each year from malignancy, ten thousand are due to carcinoma of the uterus. We are limited in handling this disease, since we have only local measures with which to treat a condition local only at its inception. At the time diagnosis is made at least 40 per cent of the cases of uterine and cervical cancer have microscopic extension along the lymphatics.

Four methods of treatment are available: excision by anatomical dissection, excision by cautery, destruction in situ by heat and destruction in situ by radium. Radium furnishes us the method of choice for precancerous conditions. Patients

readily submit to its use. Excision in the hands of operators good, bad and in-different carries a primary mortality of 20 per cent and gives but 4 per cent of five year cures. Excision is of greatest value in carcinoma of the fundus.

Statistics show that heat in the hands of Byrne, Werder and Percy has given better results than excision in the hands of its most enthusiastic advocates. Since radium is efficient for a distance of only two or three centimeters from its point of application, its action must be considered local. It affects both normal and diseased tissue and in no way renders the body resistant to cancer. Because we cannot be sure that all the cancer cells are reached, radium alone is not the treatment for early operable tumors. In cases more advanced, excision by one of the cautery methods will give the best results. In advanced cases with wide infiltration of the parametrium we must necessarily turn to radium and the x-ray. In the vagina and uterus radium sometimes produces startling regression but unfortunately relapses are the rule. Only a few cases remain well for the five year period. Cross fire with the x-ray is advocated in addition to radium. If it can be worked out, a method including diathermy, radium and the x-ray would seem to hold the greatest hope for these cases.   H. W. Shutter.

Pinch, A. E. Hayward: Remarks on Radium Therapy in Uterine Cancer. British Medical Journal, June 18, 1921, No. 3155, p. 881.

The author classifies the cases clinically into three groups: (1) The endocervical or medullary type which he considers to be the most malignant type of the disease; (2) The flattened ulcerated type which grows more slowly; (3) The proliferative fungating type, probably the least malignant of the three. From the standpoint of therapy the cases are divided into operable, borderline, and inoperable cases. The operative cases are advised to have immediate operation with subsequent radium treatment, the borderline cases to have radium treatment first with subsequent opera-tion. The third group is treated with radium alone.

The endocervical type is treated with 150 mg. of radium, screened with 1 mm. of silver, left in the cervical canal for twenty-four hours. This may be supplemented by the introduction of emanation tubes into the cervical walls and also by the radia-tion of the whole body of the uterus and pelvic cavity generally by the use of ap-plicators screened with 2 mm. of lead applied externally above the pubes and in both iliac fossae. For the flattened, ulcerated type, radium applicators are put in direct contact with the diseased portion of the cervix. Radiation of the general pelvis is accomplished as mentioned for the preceding type. For the proliferating, fungating type, as much of the growth as possible should be excised preliminary to the radium treatment. The cervical stump is then treated with a 100 mg. tube with 1 mm. of silver filtered for twenty-four hours. Emanation tubes and the radiation of the body of the uterus and pelvic cavity should also be used. The vaginal mucosa and the recto- and vesicovaginal septa are carefully protected.

Treatment of carcinoma of the fundus consists of the introduction of 150 to 200 mg. of radium, with 1 mm. of silver screen, into the uterine cavity to be retained for twenty-four hours. The treatment is to be repeated after an interval of at least two months. This should also be combined with general external irradiation of the whole pelvic cavity. Recurrence is extremely susceptible to radium treat-ment.

There is considerable diversity of opinion as to the best method of prophylactic radiation. It is generally agreed that the procedure is often of great value. Radia-tion five or six weeks before operation is of particular use in borderline cases. Prophylactic irradiation immediately before operation is of great service in fungat-ing cases as preliminary to major operations. After the removal of the cauliflower

growth, 150 mg. screened with 1 mm. of silver should be introduced for twenty-four hours two or three days prior to the operation for hysterectomy. Irradiation three or four months after operation should be used routinely after all cases of Wertheim's hysterectomy but considerable caution should be employed. A large prophylactic dose administered too soon after Wertheim's hysterectomy may favor the breaking down of the recto- and vesicovaginal walls.   F. L. ADAIR.

Franqué, O.: Radiation for Cancer of the Uterus and Dysmenorrhea. Medizinische Klinik, 1922, xviii, 817.

Franqué, by combining operation with subsequent prophylactic ray treatment cured 50 per cent whereas when radiation was not used there were only 47 per cent cured. Bumm and Warnekros after a four year period of observation obtained 71.8 per cent cures after combined treatment as opposed to 35.7 per cent where radiation was not employed after operation. Because of these findings, Franqué lays down the dictum: Every easily operable case of carcinoma of the uterus should be operated upon and should have careful radiation afterwards. The borderline cases however can be radiated with good results and without a high primary mortality, especially if radium and the x-ray are used together. Döderlein using only radium and mesothorium in 77 cases of carcinoma of the cervix, obtained 48 per cent cures after 5 to 8 years and the author hopes that a time will come when 85-90 per cent of all cancers of the uterus will be cured by radiation.

Cancer of the body of the uterus can be cured in most cases by either operation or radiation. In the Bonn clinic, 93 per cent were operable and 80 per cent were cured after 5 to 8 years, without radiation.

Although there are no rays which are selective in their action and destroy only cancer cells, the author believes that in every radiation the different tissues are acted upon with different intensities. The rays destroy cancer cells, they stimulate the surrounding connective tissue to regenerate and they have no action at all on the normal organ cells, that is, the epithelium.

Franqué advises against the use of radiation to produce castration for dysmenorrhea.   J. P. GREENHILL.

Küstner: Shall We Operate or Radiate Uterine Carcinoma? Deutsche medizinische Wochenschrift, 1922, xlviii, 1640.

Küstner admits that radiation makes a definite appeal not only to the patient, but also to the gynecologist of limited operative ability. He also admits that better results are obtained since the perfection both of apparatus and technic, and states further that radiation has been by no means discarded at the Breslau University Clinic. On the whole, however, he thinks that it is quite generally admitted that radiation has not produced the results which had been anticipated, and is not as universally employed at present even at those clinics where especial pains have been taken to develop a perfect technic.

So far as the political troubles in Silesia permitted, he followed up the operated cases of the Breslau clinic and was able to account for one-fourth of the total number of cases as being alive after five years. One-fifth of the total number was alive and free from any evidence of recurrence. While this is not a very brilliant showing, it is better than can be obtained by radiation alone. He expects improved results because they now radiate all cases after operation.

The primary mortality should not be high. In their last 55 cases they had but one operative death. Since carcinomata are commonly infected with streptococci, they administer a dose of antistreptococcic serum at the time of operation and drain both through the vagina and the abdominal incision.   R. E. WOBUS.

Letulle, Maurice: The Action of Radium upon the Cancerous Uterus. La Présse Médicale, Feb. 11, 1922, xii, 121.

The author studied microscopically a number of carcinomatous uteri which were removed at varying intervals after one or more applications of radium. He found that when radium is placed in contact with the uterine mucous membrane it acts as an energetic caustic; variations in the intensity of the dose and in the duration of the application do not seem to produce variations in the result obtained except as regards the depth of the destructive changes. Whether treating a simple hypertrophy of the mucous membrane or a uterus whose musculature is largely infiltrated by cancer, the scar obtained is first of all characterized by its persistence and by the tenacity with which it adheres to the deeper, still living parts, be they healthy or cancerous. This scar, covered by a fairly thick, pulpy, and semi-dry mass of detritus, has been noted as long as three and a half months after the radium treatment. This persistence is due to the fact that in such scars the onslaughts of the white blood cells are stubbornly resisted. In one specimen, examined microscopically more than ninety days after an application of radium, Letulle found, deeply placed, several tiny purulent collections scattered throughout enormous areas of compact hyaline material. Such a ''delayed suppuration'' explains the persistence of necrotic layers on the surface of a cancerous ulcer after radium treatment.

The author also noted that some of the arteries and veins have undergone a peculiar alteration best described as a ''fibrinous necrosis.'' The entire vessel wall and the surrounding tissues for some depth are transformed into a laminated fibrillary material, all cellular elements have disappeared, and the histo-chemical reactions of these areas resemble those of fibrin. Still, the lumen remains permeable, the blood circulates freely, and no clot (which might serve as a rapid hemostatic agent in case the escar were removed) is present in the interior of the vessel. It is evident that these vascular necroses are the results of the activity of radium emanation; the author thinks that there is a sort of selective action involved, as these altered vessels are often found surrounded by unchanged tissues. The same lesion was found in noncancerous tissue surrounding a rectovaginal fistula due to radium, hence it is not peculiar to malignant structures. E. L. KING.

Naujoks, H.: Cure of a Case of Chorioepithelioma Malignum by Roentgen Rays. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lviii, 189.

There are many questions about chorioepithelioma which are still in dispute. One of the most interesting is the attempt to classify the condition into benign and malignant types and the means of differentiating them. The treatment of the condition is far from uniform; but in general a radical operation is performed nowadays when a diagnosis of chorioepithelioma is made. As with all malignant tumors, subsequent radiation is recommended. Four cases were reported in the literature where radium was used. The local tumors disappeared but the patients died of metastases. The author does not know of a single instance where the x-ray alone was used for this condition, but he reports a case of his own in which this treatment was attended with good results. The patient was a quintipara who developed a chorioepithelioma; but her general condition was so low that operation was contraindicated. She had metastases in her lungs and vagina. Roentgen rays were applied to the abdomen, back and vagina and after three months the patient was subjectively very well and she had gained ten pounds. The metastases had disappeared. Further treatments were given and the genitalia were normal six months after the first treatment. Microscopic sections of fragments removed proved that the condition had been a chorioepithelioma. Whether a permanent cure will be obtained is unknown, but at the end of nine months the patient was well. She will receive further roentgen ray treatments to prevent a recurrence. J. P. GREENHILL.

Frankl and Amreich: The Histological Changes Incident to Radium and X-ray Treatment of Uterine Carcinoma. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 162.

Beginning three days after radiation, the cancer cells were found to show definite retrogressive changes. These consisted of edema, swelling of cell body and nucleus, vacuolization and, later on, complete destruction of the cells, accompanied by an infiltration of lymphocytes. The degenerative changes were most apparent from the fifth to the seventh, and totally absent after the fortieth day, the destroyed area having been replaced by connective-tissue at this time. In cases where the cells had not been completely destroyed by the rays, they were found to have taken on renewed active growth on the fortieth day. This occurred, for instance, at the periphery of an area of radiation.

These authors believe that the destruction after x-ray exposure is more rapid, the intermediary changes such as swelling not being in evidence. Hence they advise the use of radium in the crater of a carcinoma, and x-ray for the destruction of cells in the parametrium and pelvic glands.   R. E. WOBUS.

Knox, Robert: The Treatment of Gynecological Conditions by X-Rays and Radium. British Medical Journal, Oct. 14, 1922, No. 3224, p. 678.

In nonmalignant neoplasms of the uterus (fibromyoma) radiations should not be used (1) in submucous pedunculated fibroids, (2) in case of associated degenerative changes and (3) of complicating inflammatory conditions either acute or chronic. He thinks operative measures should always be considered in malignant diseases of the uterus. If a complete operation is impossible, a combination of x-ray and radium treatment should be used. While the advantages of the x-ray treatment are: its painlessness, non-interference with ordinary life, no elaborate preparations, absence of serious complications; its disadvantages are: long duration of treatments, failure of the treatment (either partial or complete), the possible unfavorable changes in the blood. Dangers of the x-ray are due largely to indiscriminate and improper use.
                F. L. ADAIR.

Recasens, Sebastian: Roentgen Therapy in Gynecology. Revista Espanola de Obstetricia y Ginecologia, 1922, vii, 1.

Myoma Uteri. The author does not believe that merely the large size of a tumor is a contraindication to x-ray therapy. In those cases where pressure symptoms are marked operation should be advised, also where sarcomatous or carcinomatous degeneration of the tumor has taken place, and then operation should be followed by powerful applications of x-ray.

The technic of roentgen treatment is based upon the administration of a dose sufficient to abrogate the function of the ovigenic tissue. Castration of the two ovaries is best done at an interval of about eight days in order to disturb the patient as little as possible. It is generally agreed that the treatment should be given in the days immediately following menstruation, in order to prevent the development of the graafian follicle which is to govern the succeeding menstruation.

Metropathic Hemorrhage.—This condition is most common at puberty, and at menopause, and is probably dependent upon ovarian dysfunction. Radiotherapy produces its best results when applied to cases at or near the menopause. A temporary castration may be tried in young girls, but is not without danger, in that permanent sterility may be produced; consequently radiotherapy is indicated only in cases where metrorrhagia is so intense and so refractory to medical treatment that it is preferable to chance a definite castration rather than to risk the life of the patient.

The author believes that radioactive substances used in this way on younger individuals do not permanently disturb the normal function of the sex cells. If an unsuspected pregnancy exists in a patient subjected to x-ray therapy, there is a great danger of the death of the embryo and a resulting abortion.

Hemorrhages of Adnexal Origin.—They are common in young women as a result of inflammatory processes involving tubes and ovaries. If the patient is presumably in a condition of sterility as a result of such inflammation, roentgen radiation may serve the double purpose of relieving the inflammatory process, and at the same time of curing the hemorrhage. Radiotherapy is contraindicated, however, in cases of salpingooophoritis where, although there are intense menorrhagias, it can be expected that the existing sterility is not absolute. In those cases of menorrhagia with marked adnexal symptoms, especially accentuated in the days preceding and during menstruation, and in which cystic foci can be demonstrated, x-ray treatment may be used to advantage, especially if, after producing temporary or permanent castration, diathermic currents are used.

Osteomalacia.—Ever since Fehling discovered that 87 per cent of cases of osteomalacia are cured by extirpation of the ovaries it has been accepted that the genesis of this condition is founded on dysfunction or hyperfunction of the ovaries. For advanced cases where definite castration is indicated it is better to bring this about by means of x-ray than by laparotomy.

Pulmonary or Laryngeal Tuberculosis.—After a detailed examination of each case on its own merits there is no contraindication to x-ray castration, provided the patient and her husband have been instructed regarding the aim of such treatment, and provided they have been informed that a temporary castration, indicated in certain of these cases, may prove to be a permanent one.

Cancer of the Cervix.—The author recognizes four groups: (1) Circumscript growths confined to the cervix itself; less than 5 per cent of the cases seen by the author; (2) cervical cancer with slight parametrial propagation; about 6 or 7 per cent of cases; (3) cancers with extension to intestine, bladder, and other neighboring organs; (4) cases further advanced than Group 3 and with marked general cachexia.

In Group 1, although the growth is perfectly operable, and although the operation is of relatively slight gravity, the author prefers radioactive treatment.

Group 2 presents those cases in which there is a pronounced divergence of opinions regarding the relative merits of operation and of x-ray treatment. These cases are not inoperable, but following operation considerable doubt often remains as to whether all the growth has been removed. The author favors radioactive treatment for cases of this sort, because the best operators show a mortality of 10 to 16 per cent, and only in 50 per cent of cases relieved by operation is there a survival of more than three years.

In Group 3 all agree that radium and radiotherapy should be employed. Every observer who has used this method over a period of several years has seen cases where complete disappearance of the growth has occurred.

In Group 4 nothing can be expected of any form of treatment.

Since 1914 the author has advocated the use of radium, a tube of 40 or 60 mg. of the element placed in the midst of the growth, with applications of x-ray as a coadjuvant.

Up to a year ago it is certain that the number of five-year cures of this condition did not exceed 26 per cent, but with the above method of roentgen therapy it may be hoped to bring the percentage to 30 or 35.

Cancer of the Corpus Uteri.—The operative mortality for this condition is so low that the author prefers operation to radioactive treatment, provided the patient

be not diabetic, nephritic, or excessively obese; for such cases the treatment should be radium plus x-ray.

Cancer of Vulva.—Vulvectomy is so simple that surgical treatment is indicated, but the groins and iliac fossae should be radiated.   THOS. R. GOETHALS.

Benthin: **Experiences with Roentgen and Radium Therapy.**   Zeitschrift für Geburtshülfe und Gynäkologie, 1921, lxxxiii, 432.

The author reports the results of 261 cases treated by radiotherapy in the Königsberg clinic from 1915 to April, 1919. These cases included the following conditions: 58 operable and 70 inoperable cervical carcinomas, 19 operable and 3 inoperable fundal carcinomas, 12 vaginal, 4 vulvar, and 18 ovarian carcinomas, 14 recurrences of cancer, 28 myomas, 33 menorrhagias, 1 pruritus and 1 cardiac decompensation (to sterilize the patient).

The operable uterine carcinomas were treated by the extended vaginal operation, followed by prophylactic radiation. Roentgenotherapy by the technic of Seitz-Wintz was employed two and one half weeks postoperative but the radium was usually first applied seven or eight weeks after operation (50 mg. quantities of radium filtered with lead brass and gauze placed in the upper vagina or in unoperated cases into the uterus or the carcinomatous crater). Twelve hour treatments with twelve hour rest-periods on each of three successive days or a total of 1800 mgh. were usually given.

In the inoperable cases exeochleation and cauterization were in some cases followed immediately by radiation; in most, however, the radium was introduced five to ten days later.

Of 30 early operable cases of cervical cancer, 13, or 43 per cent recurred; of 14 more advanced cases 10, or 70 per cent, of 15 operated but unfavorable cases, 11, or 73 per cent. Sixty-two per cent of the recurrences occurred in the first 6 months, 70 per cent in the first year and from 8 to 12 per cent more each succeeding year. The operable fundal carcinoma showed good results. Of these 89 per cent remain healed, 75 per cent over 4 years, 81.8 per cent over three years.

Of 70 inoperable cervical carcinomas none was cured; 87.5 per cent died within the first year. Of 3 inoperable fundal carcinomas 2 were lost sight of, one was improved for a time and then recurred. No recurrent cases were permanently cured.

Poor results were obtained with all the cases of vulvar and vaginal and ovarian carcinoma.

Comparatively few cases of myoma were radiated, 20 of 180, since operation is so safe and effective. Submucous or subserous development, youth of the patient, accompanying inflammatory conditions, etc., were regarded as contraindications. The results in the treated cases, were, however, uniformly good, as were those in most of the climacteric menorrhagias.

General reactions were noted in 47 cases, of these 41 were slight, 6 severe. Local complications occurred in 62 cases, of these 36 were slight, 22 severe. The local complications included rectal and vaginal hemorrhages, rectal tenesmus, vaginal burns and fistulae. The latter occurred in 8 cases after prophylactic postoperative radiation, in only 3 after treatment of inoperable carcinoma.

MARGARET SCHULZE.

Miller: **Radium Treatment of Myoma of the Uterus and Myopathic Bleeding.** Surgery, Gynecology and Obstetrics, 1922, xxxiv, 593.

During the past seven years, Miller has treated 230 cases of which he was able to follow up 183. His results encourage him to continue the use of radium in uterine fibromyoma and myopathic bleeding.

In young women with definite growths, he prefers surgery. In this class of cases, myomectomy is being done with increasing frequency. Even in those cases to be subjected to operation, he sometimes employs radium beforehand in order to check the bleeding and thus give the patient opportunity to recuperate from the acute anemia sometimes encountered.

His technic consists in placing 50 mg. of radium into the cervix from 3 to 24 hours. As filter, he uses brass and rubber. A second application is avoided as a rule. In younger women, a shorter exposure is employed, which is repeated in from four to five months if necessary. Two of a total of 107 cases treated for hemorrhage were not relieved by a second application.

Miller warns against using radium in cases of pelvic inflammation, even though the infection may be latent, as they are frequently fanned into activity and may require surgical measures to combat them. Three pregnancies were reported in the series, of these, one aborted at 4 months. Menopause symptoms were, as a rule, not severe, however, in some cases they were quite severe and persisted as long as six years after treatment. R. E. Wobus.

Heaney: Radium Versus Operative Treatment of Fibroids. Surgery, Gynecology and Obstetrics, 1922, xxxv, 625.

While using radium in the treatment of selected cases of uterine fibroids, Heaney believes that operation is preferable in the great majority of cases. In his last 300 operated cases he had one death due to pulmonary embolism and thinks that the operative mortality has been somewhat exaggerated by the exponents of conservative treatment. His usual dose of radium is 300 to 1200 mg. hours.

R. E. Wobus.

Vogt, E.: How Do Gynecological Operative Wounds Heal after Previous X-ray Treatment? Medizinische Klinik, 1922, xviii, 1491.

Several authors have recently condemned the utilization of x-ray treatment before operating for carcinoma of the uterus by the Freund-Wertheim method. Their objections were that the operation is rendered more difficult technically and that the wounds do not heal as well as usual. Vogt takes issue with these statements and bases his opinion on 28 cases in his clinic. He found that preliminary roentgen-ray therapy did not make the operation more difficult. Furthermore the wound healing was undisturbed. In all his cases the Küstner-Pfannenstiel incision was used, and in 25 the wound healed by primary union. This is as good as may be expected considering that one is dealing with carcinoma. Microscopic examination of x-rayed tissue removed from the abdominal wall showed no changes. These facts indicate that the abdominal wall and the peritoneal and pelvic connective tissue heal rapidly after x-ray treatment. There was no disturbance in the peristalsis of the bladder or of the intestines. J. P. Greenhill.

Tsukahara, Isematsu: Experimental Investigation of the Effect of Roentgen Ray upon the Internal Secretion of the Ovary. Zeitschrift für Geburtshülfe und Gynäkologie, 1922, lxxv, 36.

The author summarizes his conclusions as follows:
The operative removal of both ovaries in the rabbit causes an adrenalin hypersensitivity. Subcutaneous injection of a subthreshold dose of adrenalin causes in these animals a hyperglycemia, which is at its maximum an hour later and subsides in four hours. This sensitiveness to adrenalin is at its height in two months, after three to four months it disappears.

A bilateral application of the castration dose of radiation to the ovaries causes exactly the same result.

Anatomical investigations show a damage to the follicular apparatus. The developing follicles, particularly the ovum and the discus oophorus are most severely damaged. The primordial follicles are only occasionally damaged.

A definite influence on the interstitial gland could not be demonstrated. At any rate, there was no degeneration. A growth stimulating effect could not be demonstrated.

The inhibitory action of the ovary on the sympathetic system depends on the integrity of the follicle apparatus.

The castration dose causes no change in the uterus. Mucous membrane and musculature remain intact in spite of the changes in the ovary. The remaining glands show changes similar to those occurring after operative castration. The hypophysis shows particularly characteristic changes, with marked increase of the eosinophil cells.   MARGARET SCHULZE.

Flatau: Radiation and Hypo-function of the Ovary. Zentralblatt für Gynäkologic, 1922, xl, 1602.

Cases are cited and the technic described of x-ray treatment for decreased menstruation or complete amenorrhea with satisfactory results in 83 per cent of cases, ten out of twelve. The field for the treatment lies where a diagnosis of subnormal function of the ovary with hypoplastic-asthenic genital constitution is made. The treatment is devoid of danger.   H. M. LITTLE.

Original Communications

SARCOMA OF THE UTERUS*

By James C. Masson, M.D., Rochester, Minn.

From the Section on Surgery, Mayo Clinic

SARCOMA, as defined by MacCallum, is a tumor arising from connective tissue and retaining most of the characteristics of connective tissue, but endowed with the new power of invading and actively destroying adjacent structures and of forming colonies of its own tissue in distant organs.

REVIEW OF LITERATURE

In 1860, Mayer described sarcoma of the uterus. Two years later Virchow called attention to the condition. In 1867 Veit published an article on sarcoma of the cervix uteri. In spite of these early articles and the frequent reference to the condition by European writers, comparatively few cases were reported in this country until recent years. In 1894 Williams published an excellent monograph on the histology and histogenesis of sarcoma of the uterus with a review of the literature. In 1901 Knott reviewed the histories of 118 cases collected from the literature during the preceding ten years. In 1905 Grad directed attention to the benefits to be derived from radiotherapy. In 1907, 1908, and 1909 Taylor reported several cases. Valuable papers on the subject have been published in recent years by Proper and Simpson. Fullerton, Warner, Miller, Maroney, Hellier, and others.

It is often difficult to differentiate simple degenerating septic

---

*Presented before the New York Academy of Medicine, November 29, 1922.

polypus, myoma, and true sarcoma, not only in the gross specimen, but even after microscopic study. I am sure that if complete records were obtainable it would be found that many women had died as the result of recurrent pelvic tumors following myomectomies and semi-radical operations for tumors that were diagnosed benign. Williams reported a case in which four polypi were removed from the uterus in a period of five years; the first was considered benign, the second and third, small round-cell sarcoma, and the fourth, benign. The subsequent history of the case clearly illustrated that no malignancy existed as there was no sign of recurrence in three years.

HISTOLOGY AND PATHOLOGY

Many malignant tumors are composed of irregular and nondifferentiated cells, making it difficult to determine their origin. This has led to much confusion in the nomenclature and to the introduction of a great many unnecessary names. There is no doubt that many pathologic conditions now classified as sarcoma will be classified as separate types of malignancy as new light is thrown on their origin. The simplest classification is one based on the character of the cells and their intracellular substance. The commonest forms are: round-cell sarcoma (large or small), spindle-cell sarcoma, giant-cell sarcoma, and mixed-cell sarcoma.

The spindle-cell sarcoma is the most common type of sarcoma in the uterus; it usually develops in a fibromyoma and is often classified as myosarcoma or fibrosarcoma, depending on the type of differentiated connective tissue it most resembles. Sarcoma arising from the mucosa of the uterus may be spindle-cell, round-cell, mixed-cell, or giant-cell, and the more rare forms such as lymphosarcoma, angioblastic sarcoma, chondrosarcoma, osteosarcoma, myxosarcoma, ganglioma, and so forth, have been described. Certain authors speak of decidual-cell sarcoma, but I do not believe that this type of tumor should be included among tumors of the uterus as it probably has its origin in embryonic tissue, although as Ewing suggests, changes due to menstruation may account for the type of cell found. It is an extremely malignant type of growth. However, local conditions, resistance of the host, and so forth, will necessarily influence the pathologic picture.

Sarcomas originating in the mucosa are usually polypoid and because of interference with their circulation are likely to become edematous, and often necrotic. They are comparatively rare. Only one case occurred in the present series (1906 to 1920), but one other case was treated in the clinic about nine months ago. Spiegelberg called attention to the "grape-like" appearance of these growths and to their malignant characteristics. Certain writers designate some of them as myxosarcoma and others speak of them as round or spindle-

cell sarcoma with myxomatous degeneration. They usually occur in young patients; one of the cases in the series was complicated with pregnancy, but in some of the reported cases the patients were past the menopause, as in the case reported by Byford. Besides the polypoid form, diffuse sarcomas occasionally develop in the endometrium. They probably start from a single polypus with diffuse involvement of mucous membrane before invading the myometrium. In some of the reported cases the cervical canal was obstructed, causing reten-
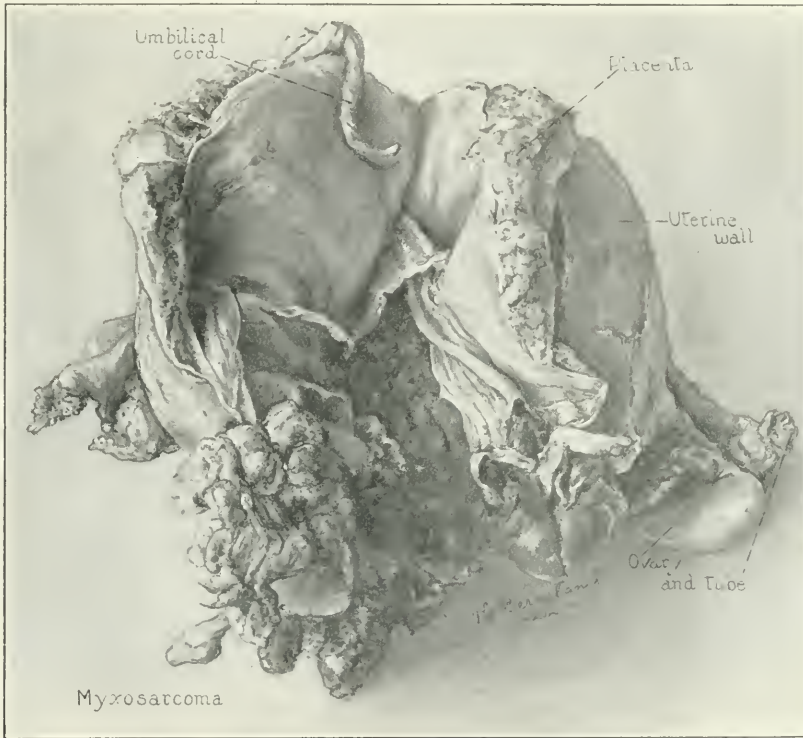
Fig. 1.—Myxosarcoma of the pelvis complicated by pregnancy.

tion of blood, mucus and serum, which later became infected and caused pyometra.

Sarcomas of the uterine mucosa are not encapsulated. As a rule they are polypoid in appearance, and for that reason, all tissue removed from so-called polypoid endometritis cases should be submitted to careful microscopic examination. There is little doubt that the malignant process begins in the majority of these cases in ulcerating polypi. Sarcomas of the mucosa as a rule are much more malignant than myosarcomas. The local growth is more malignant, with early infiltration of the perimetric tissues and metastasis to other organs, especially the lungs and liver, and more rarely to the iliac glands.

In the early stage of their development they give the classical symptoms of endometritis. Later they may protrude from the cervix and invade the vaginal wall.

Sarcomas as a group are more rapid in their growth than carcinomas; they are more vascular and as a result softer and more friable; but the fibrosarcomas and myosarcomas, the commonest sarcomas found in the uterus, are comparatively solid growths, but may have hemorrhagic areas or necrosis, as the result of interference with the circulation. Relatively, they metastasize later, and if the local growth can be completely removed the prospect for cure is better than in cases of epithelioma or adenocarcinoma. The small, round-cell sarcoma is the most malignant type and in many cases it

Fig. 2.—Sarcoma of the uterus.

leads to a fatal result in a few months. The giant-cell tumors are the least malignant and rarely, if ever, metastasize. With any type of malignant tumor, if the parametrium is invaded, extension is rapid. It has been estimated by several authors that sarcoma of the uterus occurs in from one in forty to one in fifty cases of carcinoma. In my experience, the incidence has been less. There is no doubt that many of the cases classified as carcinoma of the body of the uterus, or recurrent myoma, by the earlier authors should have been classified as sarcoma. (Figs. 1 to 6.)

Sarcomas may occur in a preëxisting fibromyoma, in the uterine wall (body or cervix), or in the endometrium. As observed in the Clinic they have been much more common in preëxisting fibromyomas. Growths originating in fibromyomas, or in the uterine wall proper,

may be either encapsulated or diffuse. They are spoken of as sub-
serous, interstitial or submucous, according to their location, but in
advanced cases it is difficult to determine where they originated.
Because of the tendency for such tumors to grow towards the uterine
cavity, many are classified as endometrial growths, whereas they
probably started in the interstitial tissue of the uterus. It is still a
disputed point whether malignant myomas are malignant from the
beginning, or whether they represent a malignant change in a tumor
that was originally benign. Bland-Sutton believes that such tumors
are malignant from the beginning. Many cases are reported in which
the patient or her physician had known that a tumor was present
for many years preceding a sudden enlargement and definite symp-
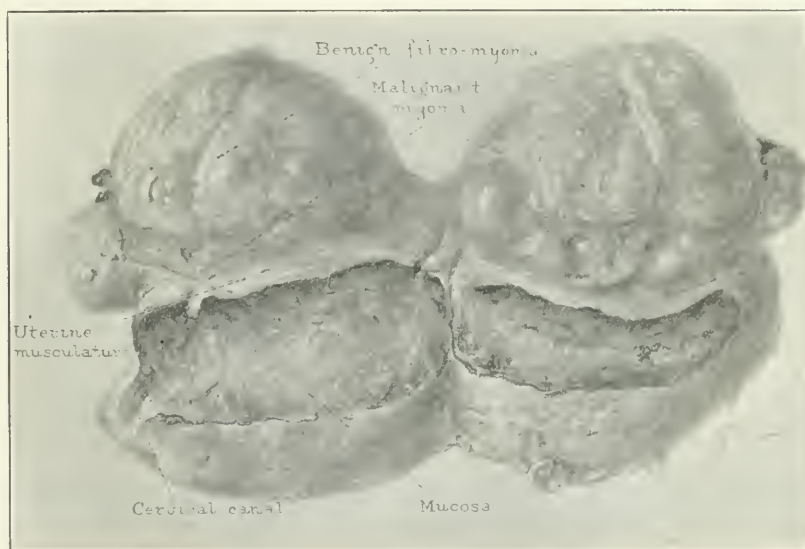
Fig. 3.—Early sarcoma. Uterus with single interstitial fibromyomatous tumor 8 cm. in
diameter. The central portion of the tumor has the white trabeculated appearance of a benign
fibromyoma. The entire peripheral portion is yellow and the surface smooth cut, similar
to malignant myomatous tissue. There is a distinct line of demarcation between it and the
central benign portion.

toms of a malignant change. Some will contend that this represents
simply the development of a sarcoma in a uterus in which there was
a preëxisting fibroid. Others will describe it as a malignant degen-
eration or change in a fibroid. There is no doubt that it will be a
difficult task in most cases to determine just where a given tumor
commenced to grow. I believe a sarcoma may develop in a fibro-
myoma and also, although more rarely, in some other part of the
connective or myogenic tissue of the uterus itself, and in the stroma
of the endometrium. In the fifty cases here reviewed the condition
was recognized as beginning in, and in most cases still confined to, a
single fibromyoma.

Multiple malignant growths of the uterus have been described by various writers; in some cases two or more distinct sarcomas have been present. In other cases, sarcoma and carcinoma have been diagnosed; such cases have been reported by Virchow, Gusserow, Klebs, Spencer, and others, and one such case occurred in my series. Carcinosarcomas or single growths with both carcinomatous and sarcomatous areas in them have been described. There is no doubt that, as Ewing suggests, many of the reported cases were either sarcomas or carcinomas of the endometrium complicated by changes due to infection, but the possibility must be admitted of the two types of tumors being independent in the beginning, and of one invading the other.

The pathologic aspect of sarcoma of the uterus is very complex. Different portions of the same tumor often show different types of
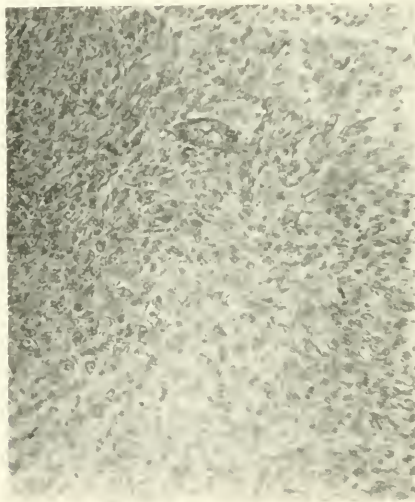
Fig. 4.—(A384667). Myxosarcoma of the pelvis (x50).

cells and arrangement of blood vessels; furthermore infection is commonly superimposed, and the resulting necrosis and lymphocytic infiltration markedly change both gross and microscopic pictures. It is not my intention to discuss this phase of the question in detail, as pathologists are not all in accord, not only as to the origin of some of these tumors, but also with regard to their degree of malignancy.

FIBROMYOMAS AND MALIGNANCY

In recent years many statistical reports have been published on the relative frequency of sarcoma in uterine fibromyomas, or the relative frequency of sarcomatous fibroids to fibromyomas. Such findings are far from uniform. Certain observers estimate the frequency of malignant change to be as high as 10 per cent, while others find it as low

as 0.4 per cent. This lack of uniformity no doubt may be attributed to the lack of a standard of malignancy, one surgeon or pathologist including cases that are not considered malignant by another.

In considering this phase of the subject, Ewing says, "These observations show that ordinary myomas vary in structure in different portions, and probably at different periods, and they seem to justify the suspicion with which the gynecologist regards the entire group. But it must be considered that these suspicious changes may not always be progressive, but may signify merely a temporary or local acceleration of growth which may subside or even regress. They do not seem to justify their designation as sarcomatous transformations for which much more extensively altered areas, or even general metastasis might well be demanded. Sarcomatous tendencies and preeancerous changes do not constitute real sarcoma or cancer."
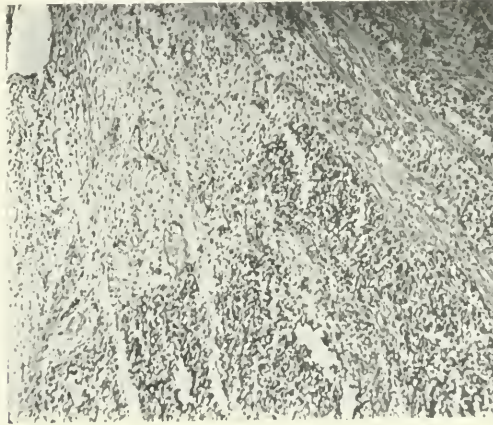
Fig. 5.—(A384667). Myxosarcoma of the pelvis. (x100).

It has long been recognized that mitotic figures are commonly found in fibroids undergoing sarcomatous change. In 1920 Evans reviewed seventy-two cases diagnosed sarcoma and cellular fibromyoma in the Clinic and found that the number of mitotic figures present was in direct proportion to the malignancy of the growth. In thirteen, mitosis was a very common finding, averaging from 2,200 to 12,000 for each cubic millimeter. Eleven of these patients were known to have had recurrence within eighteen months. In eleven cases mitotic figures ran from 200 to 800 for each cubic millimeter, and in the remaining forty-eight cases few or no mitotic figures were found. In both of the latter groups the end-results were excellent and as far as Evans was able to determine, there had been no recurrences. There is no doubt that mitotic figures are a common finding in the more malignant types of sarcoma, but whether Evans' findings will be constant remains to

be seen. In all probability they vary from time to time in the same tumor and in different parts of the same growth. Strong says, "The only safe criterion is infiltration and destructive growth. Mere richness in cells, mitosis and even irregularities in the size of cells does not constitute sarcoma."

From January 1, 1910, to January 1, 1921, 4322 patients were operated on at the Mayo Clinic for uterine fibroids and in only forty-four of these (1 per cent) were sarcoma cells found. In the same period, fibromyoma was diagnosed, but not explored in 3973 other cases. I am, therefore, inclined to believe that nonepithelial malignant tumors of the uterus are not common, and that 1 per cent of all tumors is a very high average. From the material at the Freiberg Clinic, Aschoff found that 1 per cent of fibromyomas showed sarcomatous change Many earlier writers reported a majority of their cases as originating in the uterine wall, but so far as I can judge from the material ex-
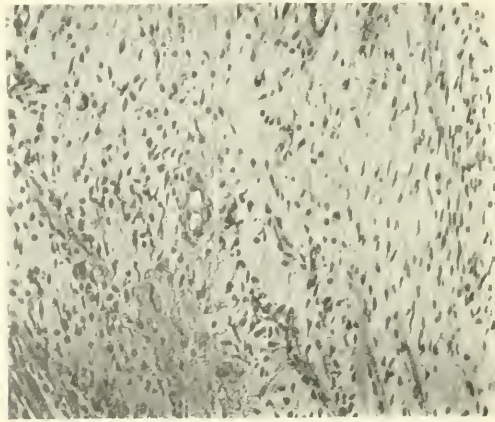
Fig. 6 — (A184003). Small round cell sarcoma at the endometrium. (X100).

amined, most cases that do not originate in preëxisting fibroids begin to develop in the stroma of the mucosa. There is no reason, however, why they should not develop from any part of the uterine wall, and in advanced cases it is impossible to know just where the malignant change commenced.

Melanosarcomas have been reported by Williams and others, but I prefer to include them with the epithelial tumors, and in a majority of cases they are probably secondary to growths elsewhere.

ETIOLOGY

The etiology of sarcoma, like that of cancer, is unknown and when discovered, will no doubt be important in controlling the disease. All we know of the two diseases is that the tumors are made up of cells more or less similar to normal cells of the body, that they

grow irrespective of the needs of the body, infiltrate and destroy neighboring tissues, metastasize to distant organs, and, if not thoroughly removed or destroyed, invariably lead to a fatal termination. There is no doubt that the two malignant diseases are in many ways similar, but they affect different tissues, metastasize differently, and, although age as an etiologic factor is no longer considered of great influence, it is nevertheless important. Chronic irritation is undoubtedly influential in carcinoma, but apparently is not influential in sarcoma. On exposed parts of the body sarcoma may follow extreme trauma, but this can hardly be a factor in sarcoma of the uterus.

SYMPTOMS AND DIAGNOSIS

The symptoms are not constant, and naturally depend to some extent on the position of the growth and a great deal on the nature of the growth. In many of the less malignant, slowly growing, encapsulated tumors it is impossible to differentiate the condition from a simple fibromyoma, while in other cases there is rapid growth, early cachexia, and a definite downward course in the well-being of the patient. Pain is more common than in cancer, and is often present between, as well as during the menstrual periods. A sarcoma occurring in the body of the uterus, or in a fibromyoma, gives symptoms during early development which are suggestive of a simple fibromyoma; later, when cachexia, hemorrhages, pain, and foul vaginal discharge are noticed, malignancy is suspected, but it is only after a microscopic examination by a competent pathologist that a distinction can be made between cancer or a necrotic benign tumor. One point of importance is the more rapid local growth of sarcoma; this is of special significance in a woman who develops postmenopause flowing with rapid enlargement of the uterus, or a tumor in the uterus, which was previously regarded as benign. Certain German writers consider the retrogressive changes due to radiation of differential diagnostic importance, since sarcomas, as a rule, respond much more rapidly than myomas to this form of treatment.

The size of the tumor and the length of time the malignant growth has been present, are not indications of the possibility of metastasis. Secondary involvement has been demonstrated in very few cases in which operation was performed, and most of the postoperative trouble comes from local recurrence. When metastasis occurs it is relatively much later than in carcinoma. Malignant tumors in the uteri of infants and young children are almost always sarcomas. No such cases occurred in this series. During menstrual life malignant tumors are more often cancerous, and after the menopause sarcomas are again relatively more common. The majority of cases occur in the fifth and sixth decades. In the fifty cases in the series the youngest

patient was nineteen years of age, the oldest was sixty-nine, and the average age was forty-four and eighty-six hundredths years, while in a series of 898 cases of cancer of the uterus treated in the Clinic during the last five years, the youngest patient was nineteen years, the oldest seventy-three, and the average age was fifty and five-tenths years.

Metastatic involvement of other organs is a relatively late development in most cases of sarcoma of the uterus. The one exception is small round-cell sarcoma of the stroma of the endometrium. When it does occur it is usually in the lungs; in the majority of cases the regional lymphatic glands are not involved until later. At necropsy small masses of malignant tissue are often found in the veins, and less often in the lymph spaces, showing that the involvement of distant organs is usually by way of the blood stream, but may also be by the lymphatics.

Weber, Dressler, and others have reported cases of general peritonitis following perforation of the uterine wall by necrotic sarcoma. Probably the most common complication is hemorrhage. In many cases this is in the form of a menorrhagia or metrorrhagia, but in some cases fatal hemorrhages have followed the sloughing of a sarcomatous polypus or the rupturing of a subserous tumor. Involvement of the ureters, bladder, and rectum, are late complications and are relatively less common than in cases of carcinoma.

Spiegelberg and Simpson both reported cases of inversion of the uterus as the result of traction exerted on the fundus by sarcomatous masses and softening of the lower uterine segment following malignant invasion.

TREATMENT

The treatment of sarcoma of the uterus is now in a transitional stage. Until recently surgery was considered the only rational treatment and in the majority of cases the results were very satisfactory; in fact, much better than in operations for carcinoma. The most unsatisfactory cases were those in which the growth originated in the endometrium, or in the cervix. It has long been known that sarcomas respond in various ways to roentgen-ray treatment. Werner and Wetterer, roentgenologists of great experience, say that it is characteristic to obtain the most surprising results in some cases and complete failures in others. The fact that even with modern technic from 20 to 24 per cent of all cases of sarcoma remain unchanged shows that definite results cannot be expected from radium therapy.

The pendulum is swinging toward the treatment of these tumors by radium and deep roentgen-ray treatments by means of which many apparent cures have been obtained. I have already referred to Grad's

convincing early papers on the subject. In 1916 Professor Baisch reported three cases treated. One patient had a very large, foul growth filling the vagina, and severe constitutional disturbances. One treatment of radium was followed by marked improvement. The patient was apparently entirely well three months later.

On the other hand, in 1918, Wagner reported a case in which he believed sarcoma developed as the result of roentgen-ray treatments for a fibromyoma. From his notes, however, it is difficult to rule out the possibility of the earlier development of sarcoma and that the roentgen-ray treatments simply caused necrosis of the growth and symptoms of acute pelvic conditions.

Von K. Franz, Kehrer, von Schauta, and Hinterstoisser have also reported cases in which the sarcoma became necrotic following radiation. Although there are no such cases in my series, I have seen the same trouble following the treatment of carcinoma, and also simple fibromyoma of the uterus. Certain writers advise immediate operation and removal of the uterus and adnexa as well as the necrotic tumor. As in all acute abdominal conditions, if an operation is to be performed, it should be performed as soon as possible after a diagnosis has been made. If not, it is advisable to treat the case expectantly by the Ochsner-Murphy treatment for peritonitis, and to open any abscesses that may develop later.

At a meeting of the German Gynecological Congress in 1920 the consensus of opinion was that no patient with sarcoma of the uterus should be operated on since the results following radiation were so satisfactory. Seitz and Wintz report eighteen patients treated by roentgen ray with four deaths (22.2 per cent). The other patients are all apparently cured, some of them for more than four years. Roentgenologists, and those with an ample amount of radium at their command are very enthusiastic over the results obtained by radiation. There is no doubt concerning the beneficial effect of these agents, but whether permanent cures are obtained in a high percentage of cases remains to be seen. I believe that, in these cases as in all malignant epithelial growths of the uterus, surgery should be resorted to early, and followed by deep roentgen-ray therapy.

For the patients with the more advanced growths and particularly for those who would be considered poor surgical risks, I advise radium in full doses to be followed by repeated courses of roentgen-ray radiation. In all inoperable cases and cases of sarcoma with metastasis, as well as recurrences following operation, roentgen-ray treatment should be given.

Many published statistics seem to show that radium therapy is very satisfactory in many cases of fibromyomas with, or without malignant change. Sarcomas as a group are more susceptible to radio-

active substances than carcinomas, and from the amount of literature on this subject, there is no doubt that we will soon have valuable data on which to base conclusions. It is unfortunate, however, that trustworthy pathologic examinations are not made in many cases believed to be sarcoma and treated as such. It cannot be said that radium is free from danger. I have had one patient die from pulmonary embolism following its use. In one case of carcinoma and in several cases of fibromyoma I have seen its use result in marked pelvic infection with abscess formation.

I have had no personal experience with the use of Coley's fluid in sarcoma of the uterus, nor have I seen it mentioned in the literature, but if given by one accustomed to using it, I should expect beneficial results, particularly when combined with radium treatment.

If surgery is decided on, a modified Wertheim hysterectomy should be performed. If the cervix is involved it should be thoroughly destroyed by cauterization immediately before the abdominal operation to prevent possible grafting of malignant cells. If the patient's hemoglobin is below 40 per cent one or more transfusions of at least 500 c.c. of blood should be given twenty-four or forty-eight hours before the operation. If, following a myomectomy, the pathologist reports the tumor to be a sarcoma or a fibromyoma with sarcomatous change, I agree with Taylor that the safest plan is to perform a panhysterectomy immediately, although simple myomectomy will, no doubt, cure many of the patients if the growth is still encapsulated.

MORTALITY

If all cases are considered, the mortality following radical pelvic operations for malignancy is rather high, but such operations should be performed only in well-organized hospitals, in suitable cases, by surgeons skilled in pelvic operations. Under such conditions the mortality should not be more than from 2 to 4 per cent.

In the series of fifty cases there were two deaths, an operative mortality of 4 per cent. Answers to questionnaires were received regarding forty-seven of the remaining forty-eight patients. Ten had died, four within one year of the date of operation, and the remaining six within two years. In all probability most of them died from recurrence of the malignant growth. Thirty-six (76.59 per cent) are apparently in good health or at least have no symptoms to suggest recurrence. One patient reported that she is feeling much worse, thinks there is a recurrence of the growth, has marked dyspnea, weakness, and dropsy. In all probability she is suffering from a recurrence, but the possibility of a cardiorenal disorder must also be considered, as it is now five years since her operation.

TABLE I

THE OCCURRENCE OF NONEPITHELIAL MALIGNANT UTERINE TUMORS AS COMPARED
WITH FIBROMYOMAS (FROM EVANS)

	FIBROMYOMAS	SARCOMA	PERCENTAGE
Proper and Simpson	357	22	6.00
Miller	9750		1.96
Lewis	1518		1.40
Olshausen	6470		1.30
Kelly and Noble	2274		2.00
Winter	500		3.20
Winter	253		4.30
Noble	337	2	0.60
Kelly and Cullen	1400	17	1.20
Martin	205	4	1.90
Fehling	409	8	1.90
Broun, Woman's Hospital, N. Y.	1500	7	0.40
Warner	100		
Including all "cellular		7	7.00
sarcomas" only		2	2.00
Geist	250	12	4.80

BIBLIOGRAPHY

(1) *Aschoff, L.:* Pathologische Anatomie., Leipzig, J. A. Barth, 1921, 591 pp.
(2) *Baisch:* Quoted by Reusch: Zentralbl. f. Gynäk., 1916, xl, 37-39. (3) *Béclère:*
Jour. d. radiol. et d'électrol., 1920, iv, 529-536. (4) *Bland-Sutton, J.:* Tumours,
Innocent and Malignant, London, Cassell & Co., 1922, 806 pp. (5) *Byford, H. T.:*
Am. Jour. Obst., 1888, xxi, 427-433. (6) *Dressler:* Quoted by Williams. (7) *Evans,
N.:* Surg., Gynec. and Obst., 1920, xxx, 225-239. (8) *Ewing, J.:* Neoplastic Dis-
eases, Philadelphia, W. B. Saunders Co., 1919, 1027 pp. (9) *Franz, von K.:* Quoted
by Hinterstoisser. (10) *Fullerton, W. D.:* Surg., Gynec. and Obst., 1914, xix, 711-
718. (11) *Grad, H.:* Am. Jour. Obst., 1905, li, 599-615. (12) *Gusserow:* Arch. f.
Gynäk., 1870, i, 240-251. (13) *Hellier, J. B.:* Clin. Jour., 1915, xliv, 417-422. (14)
Hinterstoisser, H.: Zentralbl. f. Gynäk., 1920, xliv, 977-978. (15) *Kehrer:* Quoted
by Hinterstoisser. (16) *Klebs:* Quoted by Williams. (17) *Knott, Van B.:* Ann.
Surg., 1901, xxxiii, 137-146. (18) *MacCallum, W. G.:* A Textbook of Pathology,
Philadelphia, W. B. Saunders Co., 1920, 1155 pp. (19) *Maroney, W. J.:* Am. Jour.
Obst., 1916, lxxiv, 445-450. (20) *Mayer, C.:* Verhandl. d. Berl. Gesellsch. f. Geb.,
1860, xii, 19. (2) *Miller, J. R.:* Surg., Gynec. and Obst., 1913, xvi, 315-321. (22)
Proper, M. S., and Simpson, B. T.: Surg., Gynec. and Obst., 1919, xxix, 39-44. (23)
von Schauta: Quoted by Hinterstoisser. (24) *Seitz, L., and Wintz, H.:* Unsere
Methode der Röntgen-Tiefentherapie und ihre Erfolge, Berlin, Urban and Schwar-
zenberg, 1920, 423 pp. (25) *Simpson:* Quoted by Williams. (26) *Spencer, H. R.:*
Proc. Roy. Soc. Med., 1916-1917, x, Sect. Obst. and Gynec., 82-88. (27) *Spiegel-
berg, O.:* Arch. f. Gynäk., 1872, iv, 344-350. (28) *Strong, L. W.:* Am. Jour. Obst.,
1915, lxxi, 230-248. (29) *Taylor, H. C.:* Am. Jour. Obst., 1907, lvi, 373-376. (30)
Taylor, H. C.: Am. Jour. Obst., 1908, lvii, 116-118. (31) *Taylor, H. C.:* Am. Jour.
Obst., 1909, lix, 287. (32) *Veit, G.:* Quoted by Williams. (33) *Virchow, R.:* Die
Krankhaften Geschwülste, Berlin, Hirschwald, 1864, ii. p. 350. (34) *Wagner, G.
A.:* Med. Klin., 1918, xiv, 897. (35) *Warner, F.:* Am. Jour. Obst., 1917, lxxv,
241-250. (36) *Weber:* Quoted by Williams. (37) *Werner and Wetterer:* Quoted
by Jüngling, O.: Strahlentherapie, 1921, xii, 178-202. (38) *Williams, J. W.:* Am.
Jour. Obst., 1894, xxix, 721-764. (*For discussion, see p. 443.*)

OBSERVATIONS WITH COMMENTS ON A STUDY OF THE URINARY TRACT OF EIGHTY FETUSES AND YOUNG INFANTS*

By G. VanAmber Brown, M.D., and Catherine Corbeille, Detroit, Mich.

OWING to the scarcity of records on the pathology of the upper urinary tract in early life, the following observations were made during the summer of 1922. While this report is to be considered as merely preliminary, owing to limited time and material, a number of important points will be worth noting, which with others are capable of elaboration by further study. As an aid to the work suggestions are solicited.

The material at hand may be divided into three groups. The first is made up of twenty fetuses obtained during the summer, all being recent abortions. They range from two and a half months to term. The second group includes twenty cases of young infants and prematures on which autopsy records are available, and in addition, a few scattered cases in which only the specimens were obtainable. The third is a group of forty dissections made in the Department of Pathology at the Detroit College of Medicine and Surgery. The majority of these latter cases presented some type of monstrosity or maldevelopment.

The point to be noted in connection with the nature of the material under observation is that in no case was it selective, except in those few instances in which only the actual specimen was available. A random selection was made, the percentage of kidney pathology, whether primary or secondary, being for this reason the more significant.

THE KIDNEY IN THE FETUS AS A SEAT OF CHRONIC INFLAMMATORY CHANGES

Out of the forty microscopic examinations made, seven cases showed well defined characteristics of chronic inflammation. In two of these cases, the change was of known syphilitic etiology, and in four others the evidence was also that of syphilis, though the laboratory findings were negative. It is of interest to note the early age at which these evidences of chronicity become apparent. A case of induced abortion of a two and a half month's pregnancy gave a picture of definite fibrosis of the nephrogenic tissue with proliferative increase of the

embryonal connective tissue. Another fetal kidney, of four months' development, was diffusely infiltrated with small round cells, with increased connective tissue elements—a picture of proliferative interstitial nephritis. Another, a five months' kidney, presented, in addition to the above pathology, proliferative blood vessel changes—the characteristic endarteritis of adult syphilitic lesions. It has been observed that this blood vessel involvement is not a constant accompaniment of luetic changes in early life. It may be entirely absent, while the existent changes are strikingly specific. A case of an infant, ten days old at death, clearly corroborates this observation. The kidney showed diffuse interstitial fibrosis in both medulla and cortex, with hyaline degeneration of the tubular epithelium, and no vascular change whatever.

Observations of syphilitic changes in fetal kidneys are noted by J. W. Ballantyne in his "Antenatal Pathology and Hygiene." He has found in addition to the facts noted, enlargement of the vessels of the medulla, but he does not record the possibility of the total absence of vascular pathology. Ballantyne has also reported two cases in which there was strong evidence of chronic idiopathic fetal nephritis. One baby died a few hours after birth, the other at twenty-one days. There exists, then, the possibility that the pathology of the fetal kidneys reported above was idiopathic, at least in those cases where syphilis was not the cause. No proof exists, however, that such is the case.

HEMORRHAGIC CONDITIONS INVOLVING THE YOUNG KIDNEY

Although hemorrhagic diseases are known to be of frequent occurrence in the newborn, no reference has been found to diffuse hemorrhages in young fetuses. Of the six cases observed, three were fetuses, two and a half months, three and a half months and six months old. The first of these was a pregnancy aborted by drugs. The fetus showed multiple subcutaneous hemorrhages all over the body. The abdominal cavity was filled with a sanguineous fluid, and the viscera showed multiple small hemorrhages. Microscopic examination revealed marked subcapsular hemorrhages of the kidney, though the parenchyma was uninvolved. The three and a half months' fetus did not show any external evidence of hemorrhage. The kidneys, however, looked hemorrhagic when opened, and the microscopic picture was one of small cortical hemorrhages.

The cause for hemorrhage in the kidney of the six months' fetus was probably mechanical, occurring in a case of imperforate urethra with hypertrophic dilatation of the bladder and extreme general edema. Reference will again be made to this case.

A case of primary hemorrhagic nephritis was noted in a young

infant and was considered the primary factor in causing death. There was no gross pathology other than malnutrition.

A very spectacular case of hemorrhagic diathesis and thymic apoplexy was seen in a baby of three days. (Fig. 1.) A large dark red mass was found in the abdomen, extending from the diaphragm to below the umbilicus, to which the intestines were adherent, and by which they were displaced. The mass was found to be a retroperitoneal blood clot, and when sectioned, revealed the kidney imbedded in the center. The thymus was greatly enlarged and ruptured by the excessive
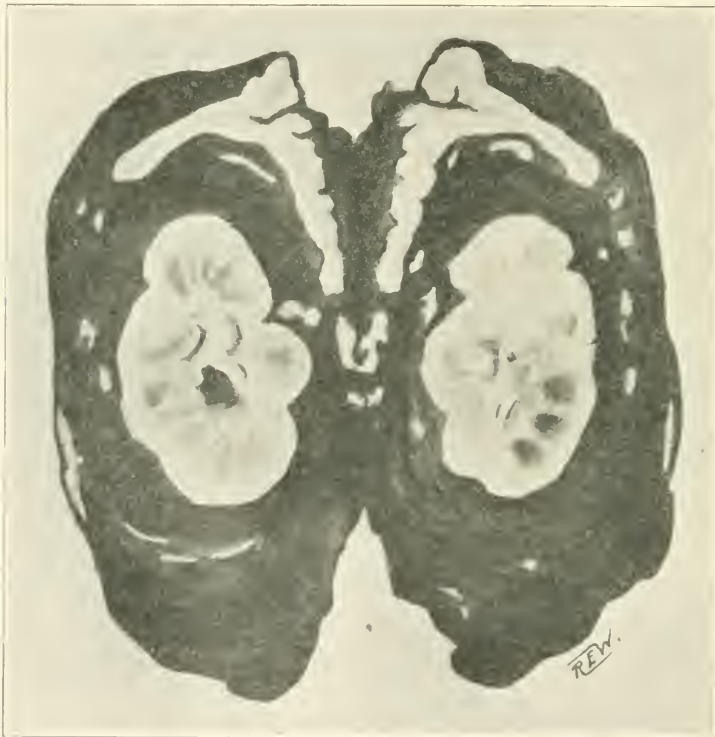
Fig. 1.—Kidney embedded in blood clot from case of hemorrhagic diathesis and thymic apoplexy.

hemorrhage. Microscopic examination of the kidney showed no minute pathology.

SECONDARY CHANGES IN THE KIDNEY IN INFECTIOUS DISEASES

In every case of death caused by an infectious process, the effect on the renal parenchyma was marked. The changes noted represent (1) actual metastasis of infection involving the cortex of the kidney, (2) interstitial changes of a chemical nature and (3) degenerative processes. The type of kidney pathology depends, evidently on the type of infection and the duration of the condition. A case of compara-

tively long-standing infection terminating in suppurative otitis media and lobar pneumonia presented evidence of metastasis of the infection to the kidney, as shown by the definite cortical foci of infection. The tubular elements were distended with fluids and in a condition of early degeneration. Two kidneys, one from a case of chronic pneumonitis and acute terminal purulent bronchopneumonia, one from a case of prematurity and malnutrition with an unknown focus of infection, presented a similar type of change, namely hyaline degeneration of the renal epithelium. The cortex in each case was a mass of degenerating elements, matted together in a way to minimize the possibility of functionating. There was intense congestion of the blood vessels and of the capillaries of the medulla in the kidney of the premature.

A picture of interstitial nephritis with obliterative parenchymatous degeneration was seen in the kidney of a four months' baby which died of acute encephalitis. All the functionating elements were shrunken and evidently nonfunctionating while the interstitial elements showed proliferation and edema.

A secondary inflammatory condition, not of an infectious nature may be mentioned in this connection. At autopsy of a six day infant, an imperforation of the common bile duct at the junction of the cystic and hepatic ducts was discovered, death having been caused by toxic bile retention. Inflammatory changes of purely chemical nature occurred in the kidney. There was albuminous degeneration of the tubules, sclerosis of some of the glomeruli and intense capillary congestion in the medulla, with retention of bile pigment in the straight tubules.

MALIGNANT TUMOR OF THE KIDNEY IN AN INFANT

Malignant tumors of sarcomatous nature are seen in early life. L. Porter and W. E. Carter report the existence of such tumors in kidneys of six months' fetuses, and refer to a case in which labor was obstructed by the presence of a large round-cell sarcoma having its origin in the renal tissue. (Figs. 2 and 3.)

In the present group, one case of renal malignancy occurred in an infant of seven months. An exploratory operation was made, but the growth had become too extensive to permit of any surgical treatment. The history of the tumor was that of rapid growth with very marked enlargement during the last days before the operation. Some of the tissue was removed following which severe hemorrhage and death occurred in a few hours. The kidney capsule was distended by the growth which appeared almost entirely intrarenal, excepting that the capsule and adjoining mesenteric lymph glands appeared involved in the tumor. The tumor was solid, opaque and

apparently divided into lobules. Considerable hemorrhage was evident within the tumor, and there was some hemorrhage without. The liver was pale and yellow suggesting depletion from hemorrhage.

RENAL CALCULI WITH CEREBRAL CALCIFICATION IN A CHILD ONE YEAR AND SEVEN MONTHS OLD

The patient was rachitic, having had a number of illnesses after the eighth month of life. First he had diphtheria for three weeks
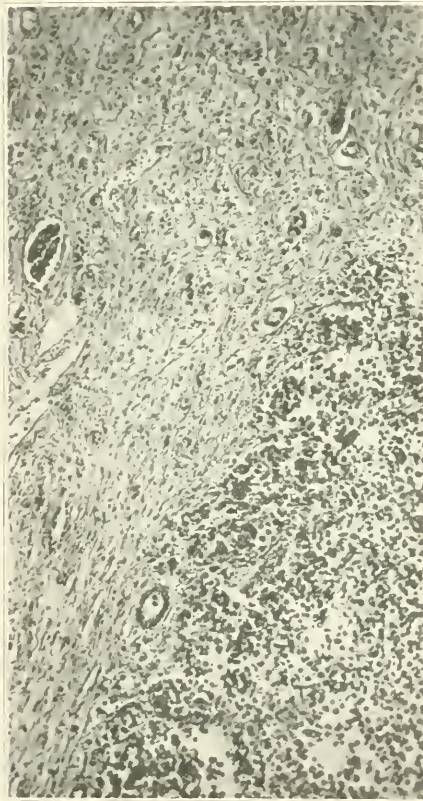
Fig. 2.—Lymphoblastoma of kidney in 7 months infant.
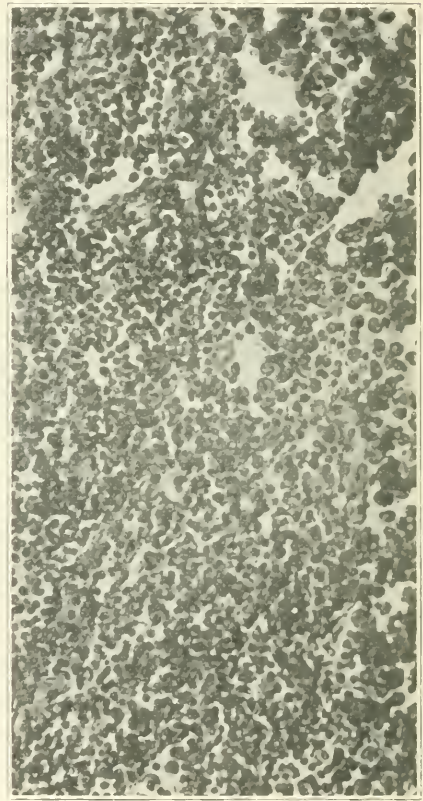
Fig. 3.—Higher magnification of neoplasm shown in Fig. 2.

from which he made an uneventful recovery. When a year and one month old he started to have a temperature varying between 100° and 106.2 . This lasted for fourteen weeks. At the same time the right arm became paralyzed. Diagnosis was not made at the time, though it was positively stated that it was not infantile paralysis. Five months later the patient had a mild attack of chicken-pox, and recovered without complications. A week before death he again developed the characteristic temperature varying between 100° and

106°, was prostrated and continually rolled his head from side to side.

At autopsy, the lungs were found to be consolidated, the brain congested. The right kidney exhibited a dilated pelvis with two

A.
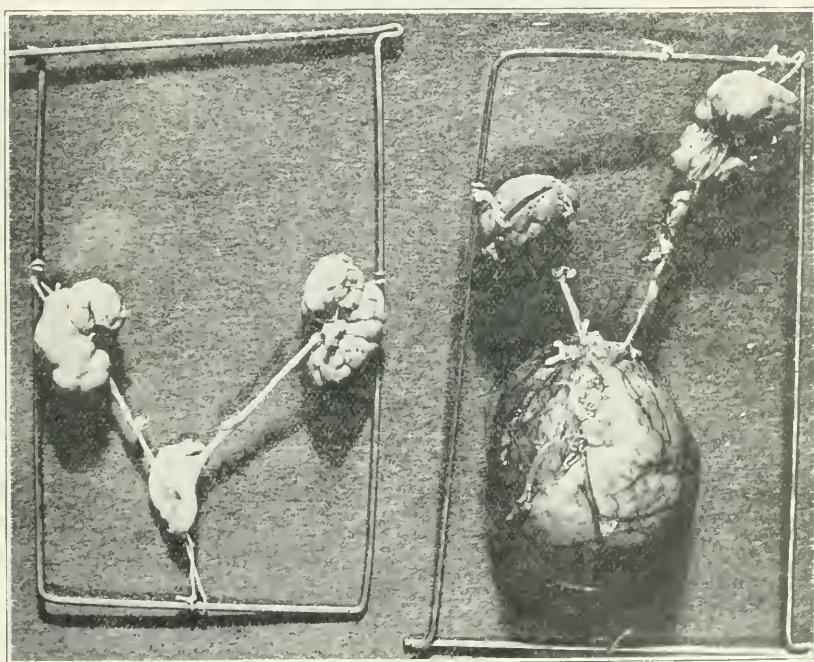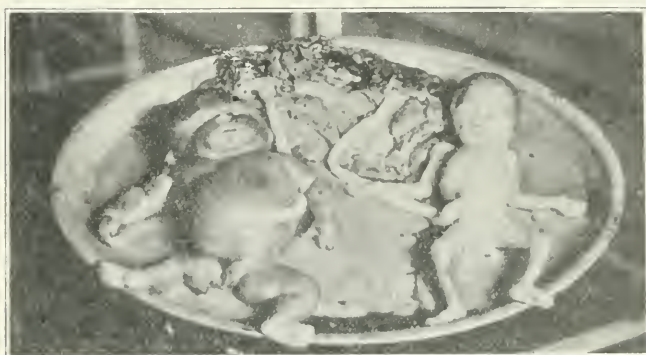
B.   C.

Fig. 4.—A. Premature twins delivered at 6 months by cesarean section.
B. Normal kidneys, ureters and bladder from normal fetus.
C. Greatly distended bladder, hydroureters and slight hydronephrosis from edematous fetus.

small concretions 3 mm. in diameter one in each of two calyces. Microscopically the kidney showed no pathology other than congestion, but the brain showed rather extensive areas of calcification, these

being surrounded by small round cells of the lymphocytic type. The spleen showed early amyloid degeneration.

Varying opinions exist concerning the frequency of urinary stone formation in infancy. F. Hinman quotes two figures in his report of a case of multiple ureteral stones in an infant. Rafin, in an analysis of thirty-nine cases of renal and ureteral stones recognized at operation and autopsy, finds none of the patients under one year of age, and only five between the ages of one and five years. But Rayer writes that renal calculi have been observed at all ages, including the fetus and infant. He cites ten cases, two fetuses of six and eight months, three newborn infants of one, two and eight days and five of three, four, six and eight months.

EXTREME GENERAL EDEMA ASSOCIATED WITH IMPERFORATION OF THE URETHRA

This occurred in one of premature twins, delivered at six months by cesarean section. The mother's blood showed a positive Was-

Fig. 5.—Horseshoe kidney.

sermann reaction. She had one child a year and a half old which was living and apparently healthy. Two days before the operation her abdomen began to ascend very rapidly, until the enlargement reached the sternum. On opening the uterus extreme hydramnios was encountered. The two fetuses were removed within a few minutes of one another. (Fig. 4.) Their appearance was strikingly contrasted. One, breathing at delivery, was small, wrinkled and poorly developed. The other, dead at delivery, was enormously enlarged by a severe, general edematous condition. Arms and legs were like bags of water, and the abdomen was greatly distended. On opening the abdominal cavity, free peritoneal fluid was encountered and the bladder was found to extend to above the umbilicus. It was greatly dilated, containing two and a half ounces of fluid; and its blood vessels were congested. The ureter was enlarged, and sacculated especially near

the kidney. The kidneys showed mild hydronephrosis, and were swollen and boggy. After dissecting out the bladder it was found that none of the fluid could be forced out through the urethra—an imperforation was discovered very near the bladder. Chemical analysis of the fluid contained within the bladder revealed the presence of urea in addition to large amounts of protein. It partook beyond a doubt of the nature of urine, and may throw some light on the much discussed question regarding the functioning of kidneys in prenatal life. The general edema may, at least partially, if not entirely, be laid to the mechanical obstruction caused by the imperforate urethra, though the enormous degree to which it had risen may
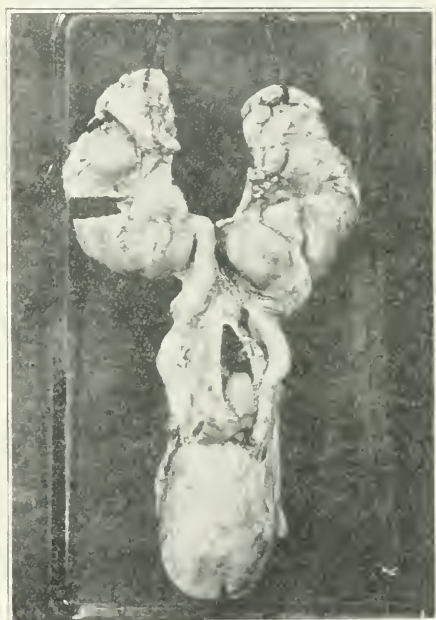
Fig. 6.—Fused kidney with double hydroureter.

have been due to some condition not accounted for. The microscopic examination showed only extreme dilatation of the blood vessels with some hemorrhage, with no characteristic luetic change. Examination of the placenta showed only mild edema.

MALFORMATIONS

Of the eighty fetuses and infants studied thirty-seven presented some form of outward malformation. Nineteen showed craniorachischisis; three, hydrocephalus; four, exencephalon; two, meningocele; two, deformities caused by amniotic adhesions; two, congenital hernia, and one each of the following: synophthalmus and arhinencephalon,

cephalothoracopagus, talipes, meningo-encephalocele occipitalis and one pair of united twins.

Malformations of the upper urinary tract existed to the extent of twenty per cent of the total number studied involving the kidney, and 11.25 per cent involving the ureters. Six cases showed hydronephrosis, four bilateral and two unilateral. Two with congenital cystic kidneys were found, one bilateral, one unilateral. Two cases showed deficiency or absence of lobulation, two pressure deformities, and two malposition, and in two, fusion, one of which was associated with hydroureters. (Figs. 5 and 6.) Of the ureteral malformations, there
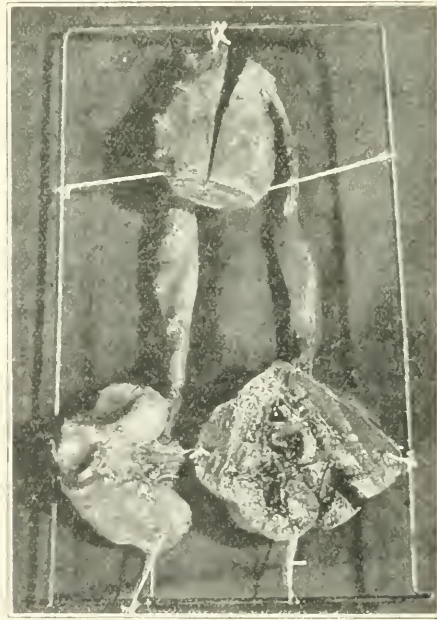
Fig. 7.—Hydroureters with bilateral congenital polycystic kidney.

were five cases of hydroureter (Fig. 7), two bilateral, three unilateral; two cases of double ureters, one unilateral and one bilateral (Fig. 8); two kinked ureters, and one of bilateral tortuous ureter. The latter was the result of malposition of both kidneys and bladder, the ureters, spirally twisted in their entire length, being enclosed in a connective tissue sheath not involved in the torsion.

The occurrence of definite kidney and ureteral deformity accompanied each of the three cases of hydrocephalus studied. One showed bilateral hydronephrosis and one unilateral hydroureter and hydronephrosis (Fig. 9). The third showed a left ureter 9 cm. long, dilated in its entire length to more than a centimeter in diameter, while on the other side the ureter was 2 cm. long, the kidney being immediately
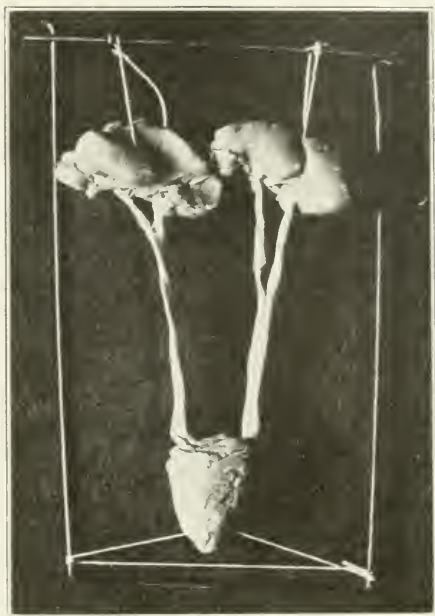
Fig. 8.—Bilateral double ureter.

Fig. 9.—Congenital non ascent of right kidney with short ureter and dilatation of left ureter.

adjacent and posterior to the urinary bladder, which was enlarged and had thick walls.

There is apparently some close relation between kidney and brain

development. Does the hyperfluidity in the urinary tract in cases of hydrocephalus, warrant raising the question of the possibility of some intimate connection between the kidney, and the choroid plexus of the brain? The frequency of kidney malformation in cases of craniorachischisis and exencephalon is also of note. Arrested development or absence of the suprarenal is also frequently a part of this type of maldevelopment. Some researchers have observed that almost every case of craniorachischisis shows absence of adrenal bodies. In the present group of cases, one adrenal associated with craniorachischisis was found, showing delayed development of the cortical zone. We are quite aware that the adrenal bodies are not an integral part of the urinary tract, but feel justified in including them in this report, since ''in their embryological development their cortex is derived, at least in part, from epithelial outgrowths which proceed from the mesonephros.'' (Heisler.)

PERCENTAGE OF PATHOLOGIC LESIONS ENCOUNTERED

It is a striking fact that upon résumé of the entire material studied, only twenty-five cases, or 31.25 per cent were found entirely free from pathology. It is true, a group comprising 13.75 per cent of the cases showed only such slight changes as edema and passive congestion, but these also aid in confirming the evidence that the kidney is a vulnerable and exceedingly responsive organ from its earliest stages of development. In this series 68.75 per cent were abnormal, and of this number only nine cases presented negligible alterations. Let it again be recalled that the material was not selected, but all that was available during this short study period was used.

CONCLUSIONS

1. Evidence of chronicity becomes apparent at an early age, even in the early months of fetal life.

2. Blood vessel involvement is not a constant accompaniment of luetic changes in early life.

3. Kidney hemorrhages, both primary and secondary, are not rare in fetuses and young infants.

4. Fetal kidney inflammatory changes may be either acute or chronic, primary or secondary, infectious or noninfectious (chemical).

5. Malignant kidney tumors of sarcomatous nature are seen during the very early months of life.

6. Renal calculus occurs in early life. (Prenatal and early postnatal.)

7. The kidney in our opinion manufactures urine months before maturity of fetus, and probably in considerable quantity. Also the

fetus may develop a toxemia from retention, in its blood stream, of kidney products independent of the blood stream or kidney efficiency of the mother.

8. There apparently is a close relationship between the kidney and the brain in their development. Also between the brain and the adrenals.

Finally: Is there a faulty metabolism that fathers maldevelopments of the urinary tract or what is there that lends itself developmentally to malcoordination?

13300 WOODWARD AVENUE.

GLYCOSURIA TEST FOR PREGNANCY*

BY PHILIP F. WILLIAMS, M.D., PHILADELPHIA, PA.

(From the Gynecological Service of the Presbyterian Hospital in Philadelphia.)

IN order to estimate the value and the relative merits of the various methods proposed during the past year of utilizing renal or experimental glycosuria as an aid in the diagnosis of early pregnancy, a series of pregnant, recently pregnant (aborting), and nonpregnant women have been tested with each of the three suggested methods. The use of an alimentary, renal or experimentally produced glycosuria in the diagnosis of early pregnancy is based upon the premise that the sugar tolerance in pregnant women is greatly below normal. Glucose as a normal constituent of the blood stream is found in a concentration of from 0.09 to 0.11 per cent. This varies somewhat with the diet and is also found to be increased physiologically in certain emotional disturbances, that is, a relative hyperglycemia occurs. During pregnancy and menstruation a slight rise in blood sugar is also present. A varying hyperglycemia exists in quite a number of pathologic conditions, as diabetes, hyperthyroidism, disturbances of liver function, and carcinoma.

The study of carbohydrate metabolism in various normal and diseased conditions has shown that different reactions follow the ingestion of large amounts of glucose in different conditions, and for these conditions the behavior of the blood sugar has been so constant that distinct types of reactions are recorded. The majority of pregnant women have been found in the so-called "Type two," in which after the ingestion of a certain amount of glucose the blood sugar percentage rises during the first forty-five minutes, and sustains this level during and after another forty-five minute interval. According to Bailey, a normal person, when uninfluenced by fluid or

---

*Read before the Obstetrical Society of Philadelphia, October 12, 1922.

fluid intake. has reducing substances for copper tests present in equal concentration in both blood and urine. Following the ingestion of glucose the urinary sugar curve runs parallel to that of the blood sugar up to the latter's concentration, 0.16 or 0.17 per cent. As the blood sugar increases beyond this point the kidneys actively engage in its elimination: as the hyperglycemia disappears the excess in excretion in the urine likewise disappears. This function on the part of the kidneys to eliminate glucose when this accumulates beyond a certain point is increased in certain diseases and diminished in others. In the past it has been customary to regard that form of glycosuria which follows the ingestion of 100 gm. of glucose, and which is demonstrable with the ordinary copper tests as digestive glycosuria, and the ability of the kidneys to prevent the leakage of sugar into the urine. as the sugar tolerance. If glycosuria follows the ingestion of 100 gm. of sugar, as glucose, one speaks of that person as having a low sugar tolerance. whereas if no glycosuria follows the ingestion of 200 gm. the sugar tolerance is considered as being high.

Several years ago Frank and Nothman observed that pregnant women had. during the early months of pregnancy. a lowered sugar tolerance without an abnormally high glycemia. From their studies they concluded that this point was of value in the diagnosis and differential diagnosis of pregnancy.

They carried out the test as follows: A fasting pregnant woman was given 100 grams of glucose in 500 c.c., of tea. The bladder was emptied immediately and specimens of urine obtained thereafter at intervals of fifteen minutes for a period of 120 minutes. The blood sugar was estimated at the time of ingestion of the glucose and at the height of the test, usually forty-five minutes to an hour later. Positive responses were obtained in all cases after about forty-five minutes, a positive response being a glycosuria ranging from 0.2 to 0.5 per cent. with the blood sugar remaining under or not above 0.17 per cent. The response was constantly negative in the cases in which pregnancy was disproved later.

More recently other observers utilized this test. and naturally certain modifications appeared advisable. The ingestion of such a large amount of sweetened fluid was followed by nausea and vomiting which interfered with the test, and to avoid this Roubitschek employed a combination of the original method. reducing the amount of glucose to 10 gm., and adding an injection of 0.5 c.c. of epinephrin solution, 1 to 1,000. This latter substance has been found to rarely produce glycosuria in normal persons in this dosage, but does so rather frequently in pregnant women. With his modification this observer found positive responses in 19 of 20 pregnant women tested.

To entirely obviate the uncertainties of the alimentary absorption of glucose, Kamnitzer and Joseph have used injections of phloridzin. Phloridzin is a drug which depresses or lowers the renal threshold

or permeability to the normal sugar content of the blood, thus permitting a leakage of sugar into the urine. In a normal healthy person 0.01 gm. will induce a glycosuria. A pregnant woman reacts to one-twentieth of this dose, 0.002 gm. In three hundred cases these observers had conflicting findings in only six cases, a remarkably high percentage. Their series included 213 control cases, 67 pregnant women, 17 aborting women and three tubal pregnancies.

In order to test these proposed methods the pregnant and aborting women in the gynecologic service of Dr. John H. Girvin, at the Presbyterian Hospital, were subjected to the tests, and I wish here to express my obligation to Dr. Girvin for his courtesies. A first series of ten women were tested by the original method proposed by Frank and Nothman. This series included six aborting women and four women pregnant earlier than four months. The blood sugar did not reach 0.16 in any case. All showed a glycosuria after from thirty to forty-five minutes. The percentage of sugar in the urine was in a few cases higher than the values given by Frank and Nothman.

A second series was then tested by the modification proposed by Roubitschek. These eight women, six aborting and two in early pregnancy, were given glucose and epinephrin. In but one case was a positive response obtained. In not one of these cases did the blood sugar rise above 0.15 per cent at the end of forty-five minutes after the administration of the test materials.

After some difficulty a quantity of phloridzin was obtained and a solution made up in exactly the manner described by Kamnitzer and Joseph: Phloridzin, 0.03 gm., procaine, 0.015 gm., distilled water, 30.5 c.c. The whole solution is boiled to ensure sterility and to dissolve the phloridzin. Two c.c. of this solution represents 0.002 gm. of phloridzin. This dose is injected into the gluteal muscles of a fasting woman. The bladder is emptied and the woman drinks 200 c.c. of water. Specimens of urine are obtained at intervals of fifteen minutes. It was found practicable to insert a catheter and clamp it, thus there is no difficulty about draining the bladder. Six specimens are withdrawn and the catheter removed.

Fourteen cases were tested by this method, eight pregnant women, four abortions, and two tubal pregnancies. In but two cases, both pregnant, was a positive response obtained. The blood sugar showed no rise during the test.

These discordant findings have been rather puzzling. A series of controls were then carried out on nonpregnant women, and in but one was a positive response obtained. This occurred in a fifty-three-year-old woman following an operation for prolapse, who showed a slight glycosuria following the administration of 100 gm. of glucose. In no other case with any of the methods was a glycosuria obtained.

Why this lowered sugar tolerance should occur in pregnant women has not been determined. There have been recorded slightly positive reactions in women at or about the time of menstruation and it is possible that some unknown influence of the corpus luteum on the carbohydrate metabolism may play a part. This seems plausible in view of the fact that the test has been found to be of no value in the later months of pregnancy, that is, that no lowering of the sugar tolerance is present. In looking carefully over the few published papers relating to this work it was noted that the reaction was said to disappear in from one to ten days after an abortion, but continued positive in the cases of abortion or tubal pregnancy where a large amount of functionating placenta remained attached, and presumably actively proliferating. This might suggest that the chorionic villi or the syncytium played a part in the mechanism whereby the reaction is produced.

Possibly at best it may only prove to be another probable sign in the diagnosis of early pregnancy, but the ease with which any of the methods may be carried out, and the entirely uniform positive results obtained by the first method would lead me to apply it as a further aid in establishing a diagnosis in a questionable case.

REFERENCES

Frank and Nothman: München. med. Wchnschr., 1920, lxvii, 1433. *Roubitschek:* Wien. klin. Wchnschr., 1922, v. 220. *Kamnitzer and Joseph:* Therapie d. Gegenwart, 1921, lxii, 321.

262 SOUTH TWENTY-FIRST STREET.

CRANIOTOMY*

BY A. M. MENDENHALL, M.D., INDIANAPOLIS, IND.

THE subject of craniotomy is one infrequently chosen by an essayist, yet its importance as an obstetric operation seems to thoroughly justify its consideration and discussion from time to time.

There are two or three reasons why this subject is not more often brought before medical societies, among them being the fact that the operation carries with it a certain gruesomeness which is not without its effect upon the operator and his assistants and audience; no obstetrician cares to perform this operation especially and has no desire to be known as an expert in this line. Then there are certain well-known religious views which are in opposition to craniotomy under a great many conditions.

Nevertheless it is not well that any of these reasons should be al-

lowed to place this important obstetric procedure so far in the background that it is in danger of being overlooked.

I am sure there is no one of any considerable experience in obstetrics who has not frequently known of cases where good opportunity and indications were present for craniotomy, but where the operation was seemingly entirely overlooked. Then again we are all aware of many cases where craniotomy has been done quite needlessly.

With my chief purpose in offering this subject for consideration being to emphasize first that craniotomy should be done in many cases where it is not done, and secondly should not be done in many cases where it is being done, I shall first of all discuss the indications.

In all cases where the fetus is dead and delivery is not progressing quite rapidly and easily, there is no doubt whatsoever about the propriety of craniotomy, except in that rare instance where we have to deal with a large child and a true conjugate of 5 or 6 cm. or less.

There is no excuse for the application of forceps to the head of a dead child. Neither do we feel that a version on a dead child is ever indicated. In case the child is dead and for any reason it seems desirable to aid in the delivery, it is far better for the mother, and in this instance she is our only patient, that we should first of all perforate and reduce the size of the head.

In this connection I desire to quote from DeLee[1] in his discussion of the impropriety of forceps or internal podalic version delivery of a dead child.

"The result of continued attempts (with forceps) is severe tears, hemorrhage, and puerperal sepsis. The mother may be left a life long invalid. The second operation that is too often undertaken to get around the necessity of hurting the dead child is version. . . . . . The operation of craniotomy is simple, requires less skill than version, has no attendant dangers, other than those the operator can avoid, sepsis and injury to the soft parts. . . . . . . To do a version, or a forceps, or a cesarean section is not justifiable when the child is dead." Still quoting DeLee[2] "No accoucheur should have any compunctions about mutilating a dead child, yet I have seen the most serious operation carried out by physicians in order to avoid the necessity of perforating a piece of lifeless clay. Either they fear opprobrium, or they overrate the dangers of craniotomy. Craniotomy is chosen, the fetus being dead, whenever an indication arises for immediate termination of labor. Craniotomy is less dangerous than forceps. Sentimental reasons advanced by the family should not stand in the way of the accoucheur doing the best for the mother. When the child is dead, even if there is no indication for the immediate termination of labor, perforation of the cranium and reduction of its size may be desirable. This is true of primiparae—we wish to save the levator ani and pelvic outlet from overstretching, and, further, it is thus possible to shorten the time of labor."

The writer believes that one of the real reasons why an operator may refrain from performing craniotomy is the fear of the family's criticism and the fear that he may be blamed for the death of the child. There can be but one answer to this attitude, tell the proper

members of the family that the child is dead and by a destructive operation upon it. the mother's life and health can be better safeguarded.

Very often during the course of a hard forceps delivery or an internal podalic version or breech extraction. it is wise to refrain from further attempts at delivery long enough to ascertain the condition of the child. and if it is discovered that the cord has ceased to pulsate. resort should be promptly made to the perforator. The obstetrician is frequently called to aid in the delivery of the after-coming head and naturally arrives some time after the death of the child and in cases of this kind the perforator is always the instrument of choice.

Not long since there was reported in the medical literature a case where a physician in attempting to extract an after-coming head succeeded only in extracting the body and leaving the head in the uterus. For the removal of this head a cesarean section was done and in describing the huge size of the head which was hydrocephalic. it was stated that an extra large incision in the uterus was necessary in order to remove the head. It would seem that in this case there were none of the indications for hysterotomy and most all the contraindications. Before the body was pulled away from the head or even afterwards it should have been quite easy to perforate and crush this head and remove it with far less jeopardy to the mother.

Above all else it seems that we need to more firmly establish in the minds of physicians that a dead baby or in this extreme case only its head. is nothing more than a foreign body and should be handled merely as such: that when the baby dies we have one and only one patient and all our efforts should be concentrated toward the conservation of the life and health of that one patient.

As to craniotomy upon a living child. many questions of doubt arise. It is not difficult to find many excellent authorities who find many indications for craniotomy when the child is still living.

First of all. and probably most frequently of all these borderline cases. is that of the hydrocephalic child. In the minds of most obstetricians there is little hesitancy in recommending a perforation where the diagnosis of hydrocephalus can be made with at least a high degree of certainty.

In our present position of being unable to give more than a very serious prognosis as to life or mental and physical development of the hydrocephalic and with a thorough appreciation of the great weight upon relatives and society by the presence of the ordinary case of hydrocephalus. it would seem that craniotomy is a legitimate and merciful operation in every case where consultation of medical men points to a definite diagnosis of hydrocephalus and at least

where the size of the head seriously jeopardizes the mother. Certainly
no mother's life should be hazarded to the extent of a cesarean section
with reasonable assurance that the child to be obtained is afflicted
with hydrocephalus. Then along with hydrocephalus should be men-
tioned a great many of the monsters with which we may come in
contact, though it is more seldom that we are able to make the ante-
partum or intrapartum diagnosis. If the diagnosis can be made prior
to delivery and especially if confirmed by the x-ray, no attempt at
cesarean section, internal podalic version, or forceps on such a case
that is offering any serious degree of dystocia should be made.

No hesitancy should be felt in perforating the head of a child prior
to viability in all cases where rapid delivery seems imperative. In
this class should be mentioned eclampsia, placenta previa, premature
separation of the placenta, toxemia, nephritis, or other constitutional
disease of the mother. Often in cases of spontaneous miscarriage a
rigid cervix very greatly delays the labor when perforation alone
would promptly end a hard and painful and sometimes dangerous
ordeal for the mother.

Lastly in considering the indications for craniotomy should be men-
tioned that rather a large group of cases where the child may still
be living but where its ultimate survival is in great doubt regardless
of how delivered and where any other operation greatly increases
the risk of the mother. In this group should be mentioned those
cases where uterine sepsis exists. In regard to this question I desire
to quote Newell,[3] who says:

"No method of abdominal delivery is safe in cases of virulent infection of the
uterus, and therefore, in these cases abdominal delivery is to be avoided, if de-
livery can be otherwise accomplished, craniotomy being the operation of choice in
cases in which no other method of delivery through the pelvis is possible, even
though the child be alive. The maternal mortality following craniotomy even on
infected cases, is less than that following any other similar abdominal operation
under similar circumstances, and the chances of the child, even if delivered by
cesarean section, under these conditions, are rather poor, many children dying of
infection a few days after birth. Therefore, the operator should not consider the
interests of the child, but should perform craniotomy if the pelvis is large enough
for the delivery of a mutilated child."

Williams[4] likewise states that:

"Although it must ever be the duty of the obstetrician to do his best
to save the life of both mother and child, it is nevertheless conceivable that
conditions may arise under which craniotomy upon the living child may not only
be perfectly justifiable, but even imperatively demanded. . . . . . . If the mother
is not seen until she has been in the second stage of labor for considerable time,
and is already infected, classical or extraperitoneal cesarean section, as well as
pubiotomy, is clearly contraindicated. In such cases the child should be sacrificed
in the interests of the mother, as the only other safe method of delivery consists in
cesarean section followed by hysterectomy, which inevitably entails complete aboli-
tion of the reproductive function. Again, if the child is in poor condition, as shown

by a too rapid or too slow heart beat, or by the passage of considerable quantities of meconium with a vertex presentation, its life is already in such peril that, against that of the mother, it is no longer entitled to serious consideration. Moreover, in country districts, where the physician is unable to summon sufficient assistance, and is without the necessary appliances for an aseptic operation, cesarean section or pubiotomy should not be undertaken and craniotomy becomes the operation of choice."

It would seem that there is but one solution to the problem of religious belief. In all cases where the best obstetrics seems to be the operation of craniotomy on a living child, then the relatives or friends concerned should have all the facts carefully placed before them. After we have attempted to explain to them the *pros* and *cons*, we can only abide by their decision, but our full duty to them has not been discharged until we have requested permission to perform craniotomy. In the handling of charity cases it is usually the rule to have all applicants for treatment in the maternity hospitals sign a statement which leaves all question of treatment to the hospital and in these instances the question of further permission is not necessary. But it is always well to know that such a permit has been signed or that proper permission has been obtained before beginning the operation of craniotomy.

Before resorting to craniotomy on a living child we should bear in mind that the extraperitoneal section as practiced by Davis and McPherson seems to offer a method of delivering the potentially infected cases with a high degree of safety; and those authorities who are advocating the low cervical section after transverse incision in the peritoneum and deflection of the bladder downward are obtaining results which bid fair to greatly reduce the indications for destruction of a living child.

As to the mortality of the operation of craniotomy, statistics vary widely. Dr. T. W. Markoe a few years ago published some records showing 12½ per cent mortality, but maintained that death was nearly always due to conditions present before beginning the operation or to the method of performing it and that such a high mortality was by no means necessary. DeLee[5] says: "There should be no mortality from craniotomy if it is properly carried out."

In a report several years ago by Voorhees[6] upon 96 craniotomies in the Sloane Maternity, there was a maternal mortality of 26.4 per cent; but the author calls attention to the fact that practically half these deaths were due to eclampsia and that many of the other cases were moribund from various causes when the operation of craniotomy was begun. No deaths could be attributed directly to the operation itself.

Among the contraindications to craniotomy might be mentioned first of all a pelvis so markedly contracted as to offer a true con-

jugate of less than 5 or 6 cm., as in such cases with an average sized child there will be experienced marked difficulty in effecting the delivery and it may be quite impossible of accomplishment.

A previous craniotomy should stand out very strongly as a contra-indication to a second one. In other words no obstetrician is at all excusable if he allows a patient in his charge to reach the stage needing a craniotomy the second time at least for pelvic disproportion. The previous craniotomy should be a warning signal, and a timely version or cesarean section should be performed in order to avoid the necessity of further loss of life. Then possibly there are a few cases of pelvic tumors or cervical disease or scars which offer insurmountable obstacles to craniotomy.

In preparing for this operation in addition to the usual antiseptic precautions there are at least a few conditions which should be ful-filled. The cervix should be fairly well dilated or easily dilatable, though of course the size of the fetal head is to be greatly reduced and full dilatation is not of the same importance as in an ordinary forceps delivery. Yet, if the craniotomy is done as we often see it done and if some of the obsolete instruments are used that are still being used, there is grave danger of serious injury to a cervix which is not well dilated.

Catheterization as in all obstetric operations is of very great importance. One of my cases gave me a very lasting impression of this, in that catheterization relieved me of possible blame for an injury which was present before I began the craniotomy. The catheter passed into the meatus properly but entered the vagina through a large laceration produced in attempts at forceps delivery before the patient came under my care.

Then unless the head is low down or very firmly impacted it is always well to have an assistant hold it firmly through the suprapubic region while the operator perforates, as it sometimes moves about to such a degree as to markedly increase the difficulties and dangers.

As to the instrument of choice it seems that most operators prefer the Tarnier basiotribe. It offers a triple combination of an excellent perforator, crushing apparatus and tractor all in one instrument and in my own experience is far superior to any other device. In addition to having the triple combination in one instrument the Tarnier basiotribe greatly reduces the probability of injury to maternal soft parts by splinters or edges of cranial bones and rarely ever slips off.

Once the perforator has entered the cranial cavity it should be carefully but positively introduced down to the medullary portion of the brain and moved about in such a manner as to quite completely

destroy the vital areas of the brain or the very disconcerting condition may arise of having the child delivered still alive. I have seen two cases in which perforation had been done and the head markedly crushed and still the babies made efforts to breathe after delivery. Authentic cases are on record of the babies living for hours and even days and one case lived for years as an idiot.

Within the past few months a case was brought to my attention where the perforator had been introduced and the baby delivered by high forceps: the child is now alive and well at two years of age. The child only shows a small scar over the area of the anterior fontanelle and to my mind it is altogether likely that the perforator was inserted between the scalp and cranium and that the cranial cavity was not entered, yet these cases serve to illustrate what may happen and to warn us against depending on mere perforation. The fingers should always be a guide for the perforator and an attempt should be made to perforate near the pubis as this will reduce the dangers of injury to the mother. In using the Tarnier basiotribe an effort should always be made to insert the perforator deeply and to apply the blades high on the sides of the head in order that the possibility of their slipping off may be reduced to a minimum. Also it is well to screw the locking device down quite firmly as in doing so the head is being reduced in size and the dangers of the instrument slipping off are still further reduced.

SUMMARY

1. Craniotomy is an operation we should have no hesitancy in deciding upon in all cases where the child is dead and there are no insuperable obstacles to pelvic delivery of the mutilated child.

2. Craniotomy upon a living child may at times be indicated if there exists little or no hope of its ultimate survival and the mother would be seriously jeopardized by any other method of delivery.

3. The operation *per se* should carry with it no maternal mortality.

4. With the safety of cesarean section in its various forms developed to where it is today, a craniotomy performed upon a living child always represents improper care either by the operator or his predecessors on the case.

REFERENCES

(1) Craniotomy of the Dead Child, *J. B. DeLee*, Med. News, lxix, 374. (2) Prin. and Prac. of Obstetrics, *J. B. DeLee*, Ed. 3, 1041. (3) Gyn. and Obst. Mono., *D. Appleton & Co.*, 1921, p. 210. (4) Obstetrics, *Williams*, Ed. 4, p. 501-502. (5) Ibid. (6) Craniotomy, *Voorhees*, Am. Jour. Obst., xlvi, p. 765.

NEWTON CLAYPOOL BLDG.

DOUBLE SALPINGOOOPHORECTOMY WITH PARTIAL AUTO-OVARIAN TRANSPLANTATION, FOLLOWED BY TWELVE YEARS OF MENSTRUATION, A NORMAL PREGNANCY AND AN UNCOMPLICATED MENOPAUSE AT FIFTY-ONE YEARS OF AGE*

By William Seaman Bainbridge, Sc.D., M.D., C.M., New York City

CASE REPORT

C. S., thirty-nine years of age; married. January, 1905, I first saw this patient in consultation with Dr. W. T. Scovil of Richmond Hill, New York, to whom I am indebted for the postoperative history of the case. At that time the patient was suffering from double salpingooophoritis, old pelvic abscesses and peritoneal adhesions, the result of two miscarriages.

Operation was advised and performed January 10, 1905. The operative findings confirmed the clinical diagnosis. Extensive adhesions matted together practically the entire pelvic viscera. Ovaries and tubes formed part of an inflammatory mass which consisted largely of multiple tuboovarian abscesses. In removing this mass a complete ablation of the tubes and ovaries was necessary. The patient, with great desire for a subsequent pregnancy, had exacted a promise from the surgeon before operation to conserve in every possible way the ovarian tissue, even if some risk proved necessary. This phase of the matter was stressed by both the patient and her husband.

After the tubes and ovaries were excised, in the mass of pus was located a small piece of ovary, about half the size of the terminal phalanx of the little finger. This piece was carefully removed, grafted at the stump of the tube, in the cornu of the uterus and covered with an omental flap. The abdominal incision was closed, except for a small tube drain, at the lower part of the wound. This was dispensed with in a week.

Convalescence was uneventful. Four months later the patient had a regular menstruation and one and a half years subsequent to the operation had a normal labor and bore a healthy child. A year later the husband died. The postmenstrual life, after being reestablished, was quite regular and normal. At fifty-one years of age menopause occurred, uncomplicated by any distressing mental or physical symptoms and the mother and child are living and well today.

Since the completion of this case history, an article on ovarian transplantation, by Dr. W. E. Estes, has appeared in the *Medical Times* of May, 1922. The author of the article reports a pregnancy six years ago following the removal of the ovaries and the reimplantation of a part of the ovarian stroma, directly at the inner opening of the fallopian tube, in the horn of the uterus. The site of the graft and the technic of the operation, as described by Dr. Estes, are practically those used by the writer of the present paper in numbers of cases during sixteen years of ovarian transplantation when the tubes were removed.

34 Gramercy Park. *(For discussion, see p. 423.)*

*Read at the Thirty-fifth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Albany, N. Y., September 19-21, 1922.

379

TRANSPLANTATION OF THE CERVIX*

By W. Wayne Babcock, M.D., Philadelphia

ABOUT 1905 I was consulted by a woman of twenty-six years, who had been married six years and whose chief complaint was sterility. In this patient the cervix was long, conical, much invaginated, anteflexed, and the anterior wall was short so that the os uteri was close to the introitus. It seemed possible that the elongation and position of the cervix might account for the sterility, and an operation
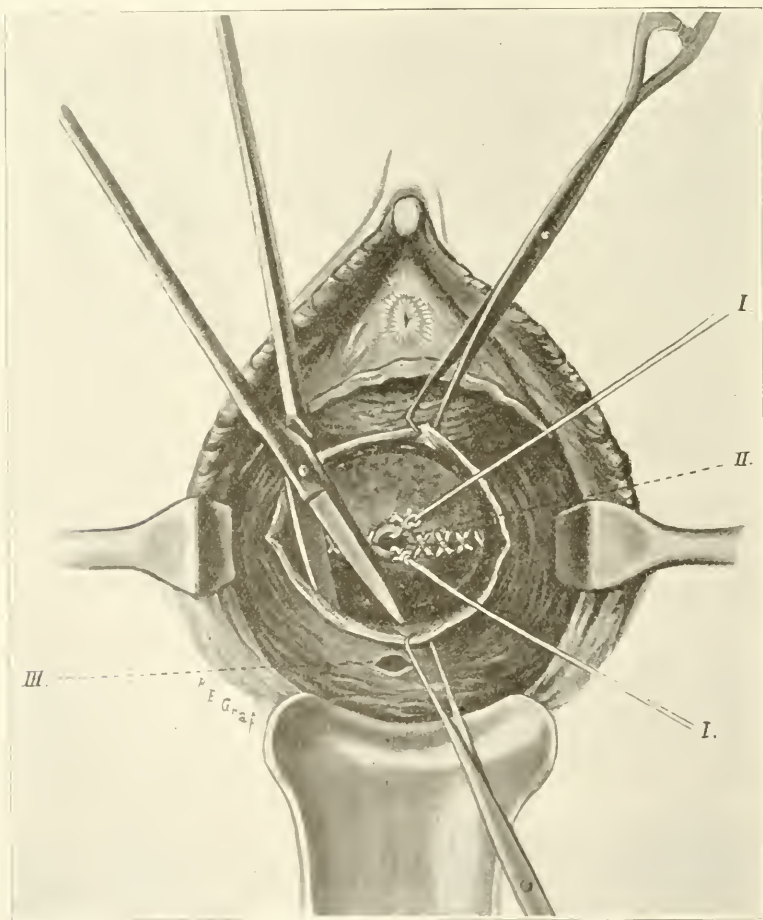
Fig. 1.—The cervix has been well freed from its overlying mucous membrane, a transverse laceration corrected, and guide sutures *I, I* introduced. The incision for the new os is shown at *III*. Often a much larger posterior incision is necessary and a much larger island of mucosa about the os *II* is left.

to transplant the cervix well back in the vaginal fornix was suggested. Under anesthesia a transverse elliptical incison was carried about the cervix, leaving a small island of mucous membrane around the os, and the vaginal wall freed from the rest of the cervix. A small transverse incision was then made well back in the vaginal fornix and the mucosa between the incisions freed by blunt dissection. By sutures fastened to the island of mucous membrane about the os passing through the first incision, under the mucous membrane and out of the incision in the fornix, the cervix was pulled back through the posterior incision and fixed by carefully uniting the mucous edges.
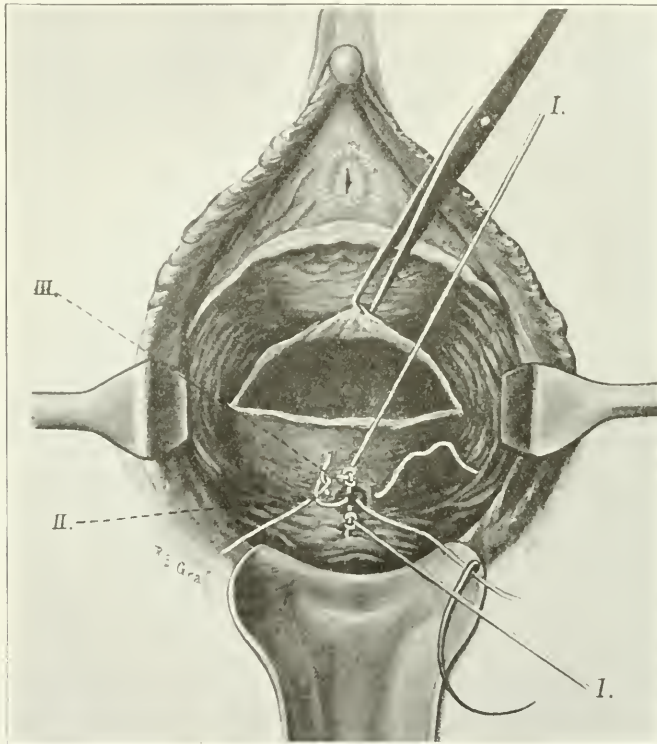
Fig. 2.—The cervix has been drawn by the guide sutures *I, I* to its new location, and the mucous edges are being approximated.

The anterior opening was closed by interrupted sutures, and the operation completed by introducing a supporting pack of iodoform gauze.

The postoperative course of this patient was not complicated, and not long afterward she returned to her home in England, became pregnant and was delivered of a healthy living child. Since this time she has borne a second child. The operation, which is a rather simple one, consists of a posterior submucous transplantation of the cervix, which may or may not be associated with a trachelorrhaphy, amputation of the cervix, or a shortening of the uterosacral ligaments.

The amount of mucous membrane left upon the cervix varies with the amount of invagination of the cervix that the operator wishes to produce, and also upon the condition of the cervix.

This operation may be indicated in:

1. Superinvagination of the cervix indicating operation where, owing to the small size of the uterus or other reason, amputation of the cervix is undesirable.

2. In certain cases of anteflexion of the cervix or anteposition of the cervix or uterus.

3. In certain cases of retroversion of the uterus favored or maintained by a short anterior vaginal wall, with anteposition of the cervix, and possibly also elongated uterosacral ligaments.
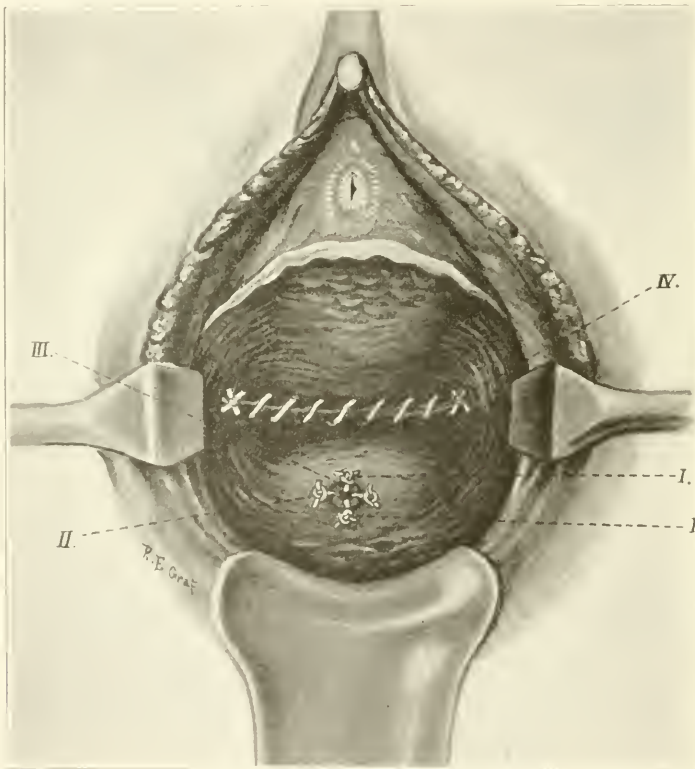
Fig. 3.—Both incisions closed, completing the operation. To further lengthen the anterior vaginal wall the anterior incision should be sutured in a vertical instead of a transverse direction.

4. In certain cases as a part of the operation for prolapsus or decensus uteri. The high posterior attachment to the uterosacral ligaments obtained serves to maintain the anteflexion and high position of the uterus in the pelvis.

5. As a part of the operation of amputation of the cervix to lengthen the anterior vaginal wall and to give added support to the cervix.

6. To facilitate the reconstruction of a mutilated cicatricial or adherent cervix, where a new cervical covering of healthy nonadherent mucosa is not readily available without the transplantation.

7. As a part of the operation of vaginal interposition.

The transverse incision over the culdesac may be used to gain entrance to the pelvis for associated intraabdominal work, and its length will obviously vary with the necessities of the particular case. The operation is conservative, easily carried out and seems to have a special, although perhaps limited, field.

Technic.—Usually it is easier to make the posterior incision first. With the patient in the lithotomy position and a weighted vaginal speculum in place, the cervix is grasped by a tenaculum forceps pulled well forward and the transverse incision through the mucosa of the fornix made. By blunt scissors dissection the submucous tissue is liberated forward to the cervix. The cervix is encircled by an incision well liberated, and after any necessary plastic work, by guide sutures introduced through the posterior incision, it is pulled back in place and the mucous edges approximated. Laterally the sutures may obtain added support by properly catching the uterosacral ligaments.

The anterior incision, if it is desired to further lengthen the anterior vaginal wall, is closed in an anteroposterior direction by sutures that should catch also the anterior uterine wall to prevent the formation of a dead space. It is obvious that the operative technic will be modified by the peculiarities of the particular case and by any necessary associated operations.

2033 WALNUT STREET.   (*For discussion, see p. 424.*)

THE PERNICIOUS EFFECTS OF THE USE OF STEMS IN THE UTERUS AND THE DANGER OF INTRODUCING SOUNDS AND OTHER FOREIGN BODIES WITHOUT PREPARATION*

BY JAMES N. WEST, M.D., NEW YORK, N. Y.

I VERY much desire to do something toward the prevention of the disease and suffering which come oftentimes as a result of the introduction of stems and other foreign bodies into the uterus and leaving them there for a considerable length of time. The use of stems in the uterus is a procedure fraught with so much danger that I cannot conceive why any surgeon with moderate instruction would resort to it.

About thirty-five years ago, the use of intrauterine stems was at its zenith, but about the time I was an interne in the Women's Hospital, in 1894, it was on the decline. It was considered in those days quite the thing to invent some variety of the uterine stem for anteflexion,

dysmenorrhea and sterility. But their use was on the decline for the reason that it was found to be an unsafe procedure which often resulted in parametritis, pelvic abscess, peritonitis, endometritis, and sometimes death, all of which the patient risked by this treatment for the relief of a minor condition. Furthermore, it was based upon a false conception of the cause of dysmenorrhea in anteflexion.

I am presenting for your inspection a collection of twelve different kinds of intrauterine stems, and although you would hardly think it, the inventor of each of these stems considered that he had added something to the sum total of gynecology that would increase his reputation and aid in the relief of suffering women. This form of treatment was dying a natural death on account of its inherent viciousness, but recently there has been a revival in the form of a pessary having a central stem fixed into a little saucer-like base, and with its intrauterine end spread out somewhat in the shape of a stretched out hair pin. The two intrauterine limbs of the stem are supposed to extend across the fundus and in that position to retain the stem in the uterus by their resilience. This stem is used for the prevention of conception and has no name. I have seen a good deal of disturbance as a result of its use and have removed several stems in my office. I am presenting herewith one case which illustrates what the use of this stem may do.

Mrs. J. I. J., age twenty-five, married six years, three children, oldest five years, youngest ten months. Normal deliveries. Admitted to Post Graduate Hospital, March 18, 1919.

Two months before admission the patient consulted a doctor for prevention of conception. He introduced an intrauterine stem to be left permanently. In the early part of March she began to complain of severe pain in the pelvis with chilly sensations alternating with high fever. The diagnosis read, pelvic cellulitis with pus formation in front of the uterus and left broad ligament. The patient was treated with an ice bag to the abdomen and with hot douches.

She was operated upon March 24. A vertical incision was made through the left rectus muscle nearly to the horizontal ramus of the pubes. A cavity was encountered containing a large quantity of pus. An incision was made through to the vagina between the bladder and uterus through which a rubber tube was brought from the abdominal incision into the vagina.

The patient was discharged improved June 28th. There was still an abdominal fistula which discharged from time to time a small amount of pus. Readmitted Aug. 8, 1920, with a double pyosalpinx and abscess of left ovary with sinus of abdominal wall. Operation August 9. Dissection of sinus. Removal of left tube and ovary, right tube and appendix. Drainage with iodoform gauze through the culdesac. Discharged Sept. 11, 1920. Improved. There still remained a small abdominal fistula.

This history of danger of death, of suffering, and permanent sterility, dates from the introduction of an intrauterine stem for the prevention of pregnancy.

The use of intrauterine stems for anteflexion still exists to quite an appreciable extent, but having heard the discussion of the subject

years ago, and having seen that the majority of gynecologists have given up their use, it occurred to me that there must be some reason why men continue such an archaic, dangerous and pernicious form of treatment. I finally have assumed that it is the result of ignorance, but there must be some authority in works of gynecology for the practice. To clear my mind on this subject, I have looked up the subject in several text books to see what position was taken by the authorities in regard to the use of stems. In some I find a most cursory mention of their use for the relief of dysmenorrhea of ante-flexion, and in some the subject is not mentioned.

I herewith present some epitomized references.

Montgomery, Gynecology, 1912. "Twenty-five years ago the employment of the stem pessary was the favorite method of overcoming an anteflexion, etc. The objection to its use is that it is a source of irritation, affords constant danger of infection to the uterine mucosa and may lead to serious trouble."

Hirst, A Textbook of Diseases of Women, 1905. "An intrauterine stem pessary which would seem to be the most suitable implement for the correction of anteflexion cannot be recommended, for the prolonged retention of any foreign body in the uterine cavity predisposes to infection of the endometrium and to secondary infection of the tubes and ovaries."

Graves, Gynecology, 1918. "As has been stated the use of intrauterine pes-saries is unsurgical in principle and may be followed by inflammatory processes in the tubes, of which we have observed two instances, nevertheless, even with this risk the procedure is regarded as justifiable and is very widely employed. If applied to the proper cases the results gained by pessaries both for dysmenorrhea and sterility are comparatively good. The pessary is left in from six weeks to two or three months. It must be very carefully watched by the attending physician, and should be removed at once if undue leucorrheal discharge or pelvic pain appears."

Crossen, Operative Gynecology, 1915, advocates its use.

There is no occasion for further quotations. A general practitioner seeking for a means of relieving sterility and dysmenorrhea due to anteflexion, turns to his work on gynecology, his answer will be in accordance with the book which he happens to have upon his shelf. If he turns to Crossen he gets advice to use the intrauterine stem. If he turns to Montgomery, he finds the subject mentioned and is advised not to use a stem. If he turns to Graves, he is told to use a stem but that his patient will be in grave danger from its use. If all of these works are read, he will be bewildered, but if he is a man of ordinary judgment he will not use a stem. The same thing which applies to the use of the stem for anteflexion and sterility, applies with still more force to the stem now being used to prevent conception. The preven-tion of conception in certain cases is a humane and proper thing, although not always legitimate, but the use of the intrauterine stem is an extremely dangerous and improper method. I wish to thoroughly discourage the use of intrauterine stems for any purpose whatever and I trust that an expression of opinion on the part of members of

this Society may be given on the subject in order that the opinion of the writer may be reenforced by the greater authority of opinions of members of this Society.

The same thing which applies to the use of intrauterine stems applies to other foreign bodies in the uterus.

In doing dilatation and curettage one should always wipe out the cervix with tincture of iodine so as not to carry the organisms which are found in the cervical canal into the body of the uterus and vaccinate them there with the curette. This applies to any other intrauterine instrumentation, except the use of forceps in delivery.

I would advise against leaving uterine packing more than thirty-six hours and then the use of iodoform gauze from which the iodoform has been washed by wringing out in water three or four times.

Finally, the ideal surgical relief for dysmenorrhea, which is practically uniformly successful, is a thorough dilatation of the cervix and Emmet's amputation to a point one-third of an inch below the internal os. This procedure has resulted uniformly in the relief of dysmenorrhea of anteflexion and in many cases has relieved sterility.

71 WEST FORTY-NINTH STREET.

RENAL TUBERCULOSIS: DIAGNOSIS AND TREATMENT*

By H. Dawson Furniss, M.D., F.A.C.S., New York, N. Y.

DIAGNOSIS

AS MY work in urology has been entirely on the female, points germaine to renal tuberculosis in women only are discussed.

If one has in mind tuberculosis whenever a patient has hematuria, pyuria, frequency or renal pain, and clings to this idea until proved, or disproved by finding another cause for the trouble, he will miss few of the tuberculous cases. In the very early, and occasionally the very late cases, one may fail, but the majority are so plainly labeled tuberculosis that there is little excuse for error.

Renal tuberculosis is a chronic disease and slow in development. In my cases symptoms referable to the condition existed before diagnosis three months in one case and thirteen years in another, with an average of approximately four years. In 20 per cent there was a history of other previous tuberculous lesions that often antedated by a number of years, the symptoms of the renal trouble. Three of these patients had bone tuberculosis that had healed five years before the onset of urinary symptoms. It is possible that the kidney lesions

occurred during the acute stage of the bone trouble and remained
quiescent all this time. In 15 per cent there were healed or active
pulmonary lesions and in two the pulmonary condition overshadowed
the renal. In three there had been an old cervical adenitis. In none
was genital or peritoneal tuberculosis discovered prior to operation,
but one patient succumbed two years after nephrectomy to pulmonary
and peritoneal tuberculous disease.

Vesical symptoms are usually the first complaint and in young
virgins frequency of urination should excite a suspicion of tuber-
culosis. The irritation is at first slight but becomes progressively
worse. The frequency is nocturnal as well as diurnal, in this partic-
ular differing from trigonitis and chronic urethritis. Slight pyuria
may be noted early: later it is always present and rather well marked.
Hematuria is often noted early, lasts usually a few days, and is I
believe nearly always of vesical origin and associated with an acute
exacerbation of the vesical symptoms. Later there is always a small
amount of blood from the vesical granulation and ulcer, and rarely
any from the kidneys. The cases vary in the degree of vesical in-
volvement and consequently in the severity of the symptoms. Some
have almost complete destruction of the kidney with only moderate
bladder disturbance, and with others just the reverse occurs.

Renal pain, usually in the form of nephritic colic, at times a dull
ache, occurs in 15 per cent. This is due to intermittent obstruction
of an already indurated and strictured ureter.

Temperature was noted in only a few, and with these there was
perinephritic abscess, ureteral obstruction, and lesions in other or-
gans. The general health was good in 50 per cent, fair in 35 per cent,
and poor in the remaining 15 per cent. When poor, bilateral involve-
ment, renal insufficiency, or disease in other organs should be suspected.
It is surprising how little uncomplicated unilateral renal lesions affect
the general health. At times patients with unilateral renal tuber-
culosis have a toxic infection of the other kidney, which clears after
nephrectomy.

Though one may suspect tuberculosis from the history, the diag-
nosis really rests on laboratory, cystoscopic—and at times x-ray, and
other methods of physical diagnosis. The very early, and at times
the very late, cases are the most difficult to diagnose.

The finding of tubercle bacilli in the catheterized urine of a woman
is almost proof positive of tuberculous disease of at least one kidney.
This statement is qualified with "almost" for the reason that tuber-
cle bacilli are at times excreted by the healthy kidney without damage
to itself. Should there be pus, blood, and impaired function of the
kidney from which tubercle bacilli are excreted, a diagnosis of renal
tuberculosis is warrantable. The bacilli can be found in at least 85

per cent of the patients either by slide preparation or guinea pig inoculation. I have had two instances of failure of guinea pig inoculation when the bacilli were discovered by staining. In some of the late cases, especially those where the ureter has become occluded, one fails to find the bacilli.

In the majority of our patients the cystoscopic appearances are so marked that to the experienced examiner they are as significant as pulmonary signs are to the skilled internist. There is induration of the ureteric meatus, in the early cases slight, but in the advanced quite marked. The orifice becomes irregular, the lips losing their elasticity and being rigid and nodular. There are varying degrees of perimeatal involvement, from simple induration to actual ulceration. The involvement of the ureter produces a shortening and consequent retraction of the meatus, often so great that it will be three-quarters to an inch behind its fellow. There is usually a "kissing" ulcer on the anterior wall, slightly lateral and on the opposite side from the affected ureter.

Except in greatly advanced cases the rest of the bladder is uninvolved—in these advanced cases the bladder capacity is almost *nil*, the outlines are so destroyed by ulceration that one part cannot be differentiated from another.

Should tubercle bacilli be found in the bladder urine, and the disease be so slightly advanced that changes have not been produced in the bladder that would indicate the kidney affected, both ureters should be catheterized and the origin of the bacilli determined. In those showing characteristic ureteral changes the suspected side is not catheterized but only the healthy one to prove that it is not diseased. We feel that catheterization of the known tuberculous side is harmful and that it gives no information not to be otherwise found. The combined function of the two kidneys is determined by phenolphthalein and blood chemistry, and the individual by injecting indigo carmine intravenously and watching the elimination through a simple cystoscope. Frequently the ureter of the healthy side is widely dilated; with the meatal lips flabby and not indurated, which will distinguish it from the tuberculous type. This is a retrograde dilatation due to back pressure, which back pressure is due to an almost constantly contracting bladder.

Where the disease is at all advanced the ureter of the involved side can usually be felt *per vaginam*, which is of value in determining the side or sides affected when cystoscopy is impossible. The size of the kidney is not to be taken too seriously in diagnosis. Very frequently the tuberculous kidney is not enlarged, is often reduced in size, and the healthy one may be the larger as a result of compensatory hypertrophy.

While the disease can be usually diagnosed by laboratory or cysto-scopic methods, there will be found a few instances in which this is impossible; then x-ray examination may be of value in showing up this condition.

When the bladder is so involved that one is not able to determine the side affected, some have advocated exploratory operation upon the bladder to catheterize the ureter, or operation upon the kidneys. In such advanced bladder disease there is also such involvement of the ureters that they can be palpated *per vaginam* and one determine the side or sides affected. X-ray may be of possible value. I should hesitate to do an exploratory operation on the kidneys and then only when the general health was good or fair, the combined urinary ex-cretion of phenolphthalein, and the blood chemistry near normal; I should explore the supposedly healthy kidney first. The condition of the ureter would more often indicate tuberculosis by its thicken-ing than an inspection of the kidney itself, for many tuberculous kid-neys have no surface indication of disease. If there was doubt, a specimen of urine could be obtained by ureteral catheter introduced through a small slit in the ureter or the pelvis. If such urine was pus-free, the probabilities would be against tuberculous infection. If pus is found, a specimen should be obtained, the wound closed and the case kept under observation, until the question of the pres-ence of tubercle bacilli could be determined. Fortunately one is seldom called upon to make an operative diagnosis. In the majority of instances a more accurate and comprehensive diagnosis can be made by the other methods above enumerated.

TREATMENT

Except in cases of miliary tuberculosis, renal tuberculosis is usu-ally unilateral, at least at first. In the consideration of treatment of tuberculous kidneys, it is necessary to know the natural history and course of the disease.

The majority of the cases will progress to complete destruction of the kidney. A small number of these will have the kidney shut off from the urinary tract by stricture formation in the ureter, and of these a few will have the disease become stationary. It is this last class that are the so-called cures, but they remain potential sources of future trouble. With the cessation of drainage into the bladder the cystic symptoms are relieved.

Unfortunately with the progression of the kidney destruction there is usually an advance of the disease in the bladder which becomes severely ulcerated and greatly contracted, making the patient mis-erable and at times life almost intolerable. In neglected cases the second kidney may become involved either through the blood stream

or by the ureter. The toxins from the tuberculous kidney are often the cause of nephritis on the other side.

A small percentage of the patients develop perinephritic abscesses.

The accepted treatment for unilateral renal tuberculosis is nephrectomy, providing there is no contraindication in other concurrent disease or renal insufficiency. The earlier the disease is eradicated, the better the chances of preventing further spread and of relieving the bladder condition. With one patient, who had tubercle bacilli in her right kidney urine (found three times) and none in the left, I was greatly chagrined to find a kidney with no discoverable tuberculous change. Since then I have made it a practice not to remove kidneys discharging only tubercle bacilli. There must be other evidences of involvement, such as pus, diminished function, thickened ureter, and ureteric meatal changes. As the disease is essentially a slowly progressive affair, one can well await the development of more evidence to warrant kidney removal and this without detriment to the patient.

With bilateral involvement some authorities have advocated removal of the kidney with the more advanced lesion. This does not seem warranted unless the better kidney has only slight lesions with good function and its ureter, with the part of the bladder surrounding it, is uninvolved. Even then, unless the patient was suffering acute renal pain, or there was vesical intolerance, I would withhold operation.

In regard to operation the chief questions involved are drainage and treatment of the ureter. Unless there has been soiling of the wound from rupture of the kidney, or persistent oozing, I refrain from drainage, and when draining use rubber tissue for twenty-four hours for oozing. If the wound has been soiled a split rubber tube is used for twenty-four or more hours, depending on the degree and character of the soiling. When there is perinephritic abscess the kidney should be removed if not unduly risky. If there are great technical difficulties drain the abscess.

Unless there is marked involvement of the ureter, or low stricture with dilatation above, the ureter is divided with a cautery, ligated and dropped. Under the other conditions, the ureter is removed to a point just above the bladder. In my experience a sinus is as apt to form after ureterectomy as after high division.

In one patient on whom I did a ureteronephrectomy there developed a sinus, subsequent involvement of the second kidney, a progression of the cystitis, and discharge of urine from the bladder through the stump of the ureter into the sinus and onto the skin. In this particular case the ureterectomy permitted discharge from the bladder which otherwise might not have occurred.

About one-third of the patients develop a sinus, and this seems to

follow in the drained as well as the undrained. Nor does resection of the ureter, except in the class of cases above mentioned, seem to favorably influence this complication. In the drained cases the sinus is noted usually during the hospital stay; in the undrained it makes itself manifest about the fourth week when they are home. This gives the undrained cases a seemingly apparent, but false, advantage. While a disagreeable complication, I have seen no harm come from it. They close spontaneously on the improvement in the general condition, though this may take from a few weeks to several months and occasionally a year or more.

In nearly all the patients there has been a postoperative rise of temperature, lasting from 24 hours to several days, with an exacerbation of all other tuberculous lesions. This I have interpreted as a tuberculin reaction, exactly similar to that after injection of tuberculin. With the first that had a severe reaction I opened the wound on a hunt for pus. The hunt was unsuccessful but the wound healed slowly with a sinus and a hernia, the only one I have had sufficiently well marked to be troublesome.

The after-treatment of these patients consists in measures to build up the patient's general health, to spare the remaining kidney overwork, and to clear up the cystitic lesions. Good results have been obtained by irrigating the bladder with boric solution in the acute stage, 2 to 3 per cent carbolic acid later. For persistent ulcers fulguration hastens the healing.

For the bilateral, or otherwise inoperable, cases much can be done for the bladder comfort in the way outlined for the postoperative vesical treatment.

Renal tuberculosis is usually unilateral, and when so, there is a favorable response to nephrectomy in the relief of kidney and bladder discomfort, and a betterment of the general health.

54 EAST FORTY-EIGHTH STREET.

BLADDER SURGERY IN RELATION TO THE FOURTH ERA OF SURGERY*

By ROBERT T. MORRIS, M.D., F.A.C.S., NEW YORK, N. Y.

HUXLEY said that science committed suicide the moment it adopted a creed.

In the course of development of the third or pathologic era of surgery during which the methods of asepsis and antisepsis made greatest advance, a number of creeds became established. The rubber glove was accepted as belonging to the ritual of procedure in bladder surgery. It distinctly lessened the surgeon's tactile sense which is required to such a high degree when he is working out an enlarged prostate gland or finding minute fragments of concretions or determining the character of several kinds of changes in the bladder wall.

The fourth or physiologic era of surgery includes the idea of doing the gentlest and most rapid work without injury to the natural protective resources of the individual. In cases in which infection of the bladder has already occurred, well prepared hands do not carry any additional bacteria to the bladder in any harmful way. In cases in which there is no infection of the bladder at the time of operation, the more rapid gentler work that is done by well prepared bare hands lessens the degree of injury to normal tissue cells and conserves their natural defense.

Another injurious part of the technic of bladder surgery belonging to the third era included the creed that drainage tubes and connections with a sterile bottle beneath the bed were essential desiderata. As a matter of fact the bladder naturally resents the presence of any such shocking contrivance and patients were made very uncomfortable beside being distinctly injured at times by the addition of this feature of the management of their cases. A certain kind of drainage device is necessary in many cases in which posture will not suffice for giving a sufficient degree of natural drainage. A retention catheter must sometimes be used but when that is the case, it should be the smallest and softest one procurable.

For suprapubic drainage I do not feel that anything is required beyond a small drainage wick excepting in situations in which we are obliged to employ packing for the control of hemorrhage. In place of the cumbersome and distressing tube and bottle arrangement after suprapubic cystotomy, a very small drainage wick is preferable. The

wound about the wick is protected by a couple of layers of iodoform gauze. Upon this gauze is placed sphagnum moss for purposes of absorption of fluids from the bladder or wound.

Sphagum moss is inexpensive and may be purchased by the bale from any dealer in florist supplies. It is hard and dry in the bale, but any lot which is to be used for bladder dressing purposes may be first soaked in a tub of saturated solution of borax, squeezed as dry as possible and then kept in large jars ready for use. As a matter of convenience, handfuls of the sphagnum moss may be twisted up loosely in a single thickness of gauze and these little "balls" of moss are easily applied for suprapubic drainage purposes. They may be thrown away several times in the course of a day if necessary and a patient wearing this sort of drainage device may be sitting out of bed by the window reading his newspaper in comfort at the time when a patient with drainage tube and bottle accommodation is lying in distress in a bed to which he is confined.

In the fourth era of surgery which makes the least possible degree of drain upon the patient's strength we may choose the wick and moss drainage device. Sphagnum moss merely soaked in clean water and then squeezed nearly dry seems to have a certain inhibiting effect upon the development of microorganisms. Aside from any additional protection given by boracic acid or borax the layer of iodoform gauze which protects the immediate vicinity of the wound guards this area well enough.

Another feature relating to fourth era methods as opposed to those of the third era consists in discarding some of the beautiful and scientifically devised instruments for examination of the interior of the bladder by way of the urethra. If the patient were a horse and a dead one at that, this sort of instrumentation would represent a very high notch in artistic skill.

Our sentient patients, however, frequently sacrificed upon the altar of wonderful device and method, stand in abject terror of reapplication of cystoscopic methods in particular. There are situations in which there is no alternative. There are many other situations, however, in which a simple suprapubic cystotomy entailing almost no suffering may give all of the advantages obtained by way of elaborate urethral route investigations.

The third era surgeon's off-hand feeling commonly includes what seems to him a kindly act when he avoids suprapubic incision and in its place offers high class intraurethral observation and treatment.

The fourth era surgeon, however, equipped with simple ways for managing suprapubic cystotomy, is prepared to give his patient almost immediate comfort in an hour in some cases in which the suffering incidental to cystoscopic work might subject the patient's life to risk.

114 EAST FIFTY-FOURTH STREET.

THE SO-CALLED HERNIA IN THE MAMMARY AREOLA

A Contribution to the Possible Etiology of the Mamma Areolata and Vicarious Menstruation

By G. L. Moench, M.D., New York

Assistant Professor of Gynecology and Assistant Attending Gynecologist at the New York Post-Graduate Medical School and Hospital

IT IS a well-known fact that phylogenetically young organs are prone to malformation in their ontogenetic development. This is shown, for example, by the frequent malformations of the genital organs. Another phylogenetically young organ, closely connected with the reproductive system, is the human female breast. Polythelia, misplaced mammary tissue,* malformations and gynecomastia are evidences of the atavistic tendencies present here and the frequency of such malformations teaches us how young an organ the human breast must be. In fact the mammary gland of the human female is unique in the whole order of mammals, both as regards the mechanism of its development and the stages of its growth. This is best seen by a brief comparison of the mammary glands in the various classes of mammalia.

In the lowest form, the monotremata, who lay eggs and whose young when they reach the outside world are too young to suckle, not even nipples are present. In these animals the milk simply exudes from the skin of the abdomen of the female where the young can lick it up. In the next higher class, the marsupialia, nipples form, but the young are generally born at such an early stage of development that at first they are unable to suckle and the milk is expressed for them by muscles similar to that which H. Friedenthal has called the musculus expressor lactis.† In the carnivora the nipples are well developed, the young able to suckle energetically at birth, but except at the time of lactation the nipples are very inconspicuous and disappear under the fur. In some classes of the ungulata the nipples are more prominent but in none of the mammals until we reach the higher primates (gorilla, orang-utan, chimpanzee, and gibbon) do we see anything which would even suggest an areola. In the apes an areola and tubercles of Montgomery are present although small. In not a single class of mammals, however, except man, do we have any mammary gland enlargement until pregnancy and lac-

---

*One of the oldest cases in this respect is the one reported by Perkins in the Jour. Am. Med. Assn., 1921, p. 792, where secreting mammary tissue with a nipple was situated on the right buttock of a man.

†Beitraege z. Naturgeschichte d. Menschen. *Fischer*, Jena, 1910, etc.

tation occur. The human female is the only one who shows the growth of the mammary gland with the production of a fat pad on the pectoral muscles at puberty, as a definite secondary sexual characteristic, independent of pregnancy and lactation.*

Another human characteristic of the breast is the possibility of long continued milk production and the relatively slight retrogressive change which takes place after the lactation period. As this condition is, however, present also to a large extent in domesticated cows, and much less in wild cattle, we must see the explanation of this occurrence probably in functional overwork of the gland combined with a superabundant food supply. Such a capacity for increased milk production would seem to indicate an inherent strength of these organs had not Alfred Adler† shown definitely that weak organs are just the ones which may become modified and adjust themselves most easily to excessive demands put upon them.

These few facts of the phylogenesis of the human female breast explain why racial and individual differences and malformations, especially in the size, shape and form of the nipple and areola, are so very common. Doubtless, the customs and habits of the various peoples account for some of the racial peculiarities. The tight downward binding of the breasts practiced by some of the African tribes may, for example, be responsible in part for the bottle-shaped breasts found here.‡ Most of the differences, however, must be sought for far deeper and in fact can only be understood if apart from the phylogenetic principles involved; we also study the various stages of growth of the normal breast in the individual. These stages are well illustrated by the following diagram copied from *Stratz*, whose nomenclature I have also retained.

A. The Stage of the *Mammilla*. The slight amount of mammary tissue present here lies directly underneath the nipple and forms a flat, compact disc. (Too firm an attachment to the surrounding and underlying tissue at this stage will account for the malformation known as inverted nipple.)

B. The Stage of the *Areolamamma*. Even as early as the seventh or eighth years the growth of the mammary tissue bulges the areola upward. The nipple gradually becomes less prominent. This stage often lasts only a few weeks or months. It has erroneously been considered pathologic by some observers.

C. The Stage of the *Mamma Areolata*. The fat and breast tissue

---

*The development of the udder before lactation at times seen in domesticated, never in wild cattle, is a totally different structure histologically from the normal human female breast of puberty.

†*Alfred Adler*:—Studien ueber Minderwertigkeit von Organen, Urban Schwarzenberg, Berlin. Also translation by *Smith, Ely Jelliffe.*

‡*Ploss Bartels*:—Das Weib in der Natur und Voelkerkunde, Leipzig, Grieben. Ed. 8, 1905. Numerous other tribal customs causing changes in the breasts and other organs are also cited here and illustrated by drawings and photographs.

develop and the nipple and areola form a smaller, more convex dome on the surface of the breast.

D. The Stage of the *Mamma Papillata*. This represents the fully developed breast. The areola has been taken up again into the general convexity of the mammary gland.

In the yellow races stage D is practically always reached. In the protomorphous races, however, type C usually persists throughout life. In the white races type D represents the normal but at times type C persists.*

One form of this last type Hofstaetter** has recently reported in six cases in pure bred Arian girls as hernia in the mammary areola. He believes that the defect is caused by a lack of development or tonus of the smooth muscle fibers of the areola. In each case the areola bulged irregularly and a separation of the muscle fibers seemed palpable to Hofstaetter. The nipple frequently slanted off to one
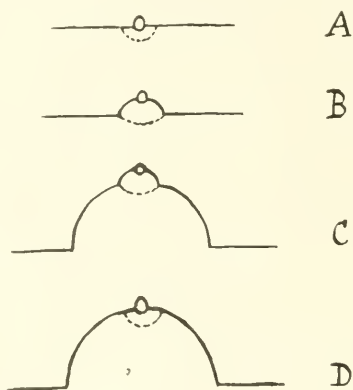
Fig. 1. The four stages in the development of the female breast in the white races (schematic). (After C. H. Stratz.)

side and at times was not erectile. Before the development of the anomaly there were nearly always drawing pains in the breasts. In those cases in which menstruation is mentioned it was usually late and scanty. All of the girls had become very stout just before the onset of the deformity. Hofstaetter advises cold bathing, muscular exercise, alcohol washings, regulation of diet, and adhesive strips to keep back the bulging. In the advanced, or long standing cases, he thinks the prognosis is hopeless but possibly operative interference might offer some hope of success. At the same time Hofstaetter quotes Friedenthal as stating that the cause of the mamma areolata in some of the black races may be a hypertonus of the smooth muscle fibers. This, however, would most certainly be the type of areola

---

*See C. H. Stratz—Die Rassenschoenheit des Weibes. Ed. 4, Enke, Stuttgart 1903. Also, Die Schoenheit des weibl. Koerpers. Ed. 15, Enke, Stuttgart 1904, and Ploss Bartels—l. c.
**Hofstaetter—Hernia in the Mammary Areola. Arch. f. Frauenkunde, viii, 105.

least predisposed to hernia and does not agree at all with Hofstaetter's previous remarks. Again, the yellow races seem always to have a mamma papillata, whereas, they show the least development of areola muscle fibers.

Hofstaetter's article interested me very much because of an identical, recent case of my own which shows that at least in some long persisting cases we are not dealing with hernia at all and a very different treatment and prognosis is indicated.

The case observed by me is that of a young unmarried woman of twenty-two (*T.M.P.*) blonde, pure bred Anglo-Saxon. She came to me early in 1922 complaining of backache and general malaise at the menstrual period, also nose-bleeding and tenderness and bleeding of the gums either just before or usually during her periods. These symptoms had been present at every period since her menstruation started at 13 years of age. The flow had come every three and a half to four and a half weeks. Once three years ago, after a cold, she had total amenorrhea for three months, during which time no vicarious bleeding was present. Family history negative. Examination showed a well developed young woman. Both breasts showed a mamma areolata, especially on the left side. The nipple here slanted toward the outside and even on irritation did not project at all above the level of the bulging areola. The hymen was intact, the uterus anteflexed, very slightly smaller than normal. The body hair was somewhat in excess of the usual female type, otherwise the physical examination revealed nothing abnormal.

As the patient did not have severe pains and told me she would soon be married, I prescribed benzyl benzoate for her dysmenorrhea and calcium chloride (by mouth or possibly as Afenil* by intravenous injection) for her vicarious menstruation.

The patient did not return for almost eight months. She then came to find out if she were pregnant as her period was a week overdue. She had been married four months previously. She had taken the benzyl benzoate when necessary, the calcium only one month, and as it had done no good, had ceased taking it. She told me that her epistaxis and tender gums had become less after the first month of her marriage and by the third month had disappeared altogether. At the same time she had had marked sticking pains in the left breast for about two weeks following the second period after her marriage. The following month she had had moderate pains in the right breast. A slight dysmenorrhea still persisted at times.

A gynecologic examination showed no signs of pregnancy, the hymen was torn, the uterus was the same size as before. The breasts, however, were changed. Both areola had flattened out considerably, especially the left side showed this very plainly. There was no longer the marked bulging of the areola which had been present before and the nipple stood out even without being touched. It reacted quickly and strongly to the slightest irritation.**

We have here then a case which duplicates, in practically all details, the six cases that Hofstaetter describes as hernia in the mammary areola but which improved as soon as sexual intercourse was established.† There can be no doubt, therefore, that we are dealing

---

*Afenil is a combination of urea and calcium and, as far as I know, the only preparation of calcium which can be used intravenously. It has had marked success abroad in cases of hemorrhage and various other conditions.

**Since then a reexamination has confirmed the absence of pregnancy.

†None of Hofstaetter's cases, with one exception, that of a young woman who seems to have developed the condition during pregnancy, were followed up to the time of marriage so that nothing can be said as to the possibility of a reaction such as occurred in my case.

in this case with an endocrine disturbance which can only be inter-
preted as one of diminished ovarian function stimulated to greater
activity by sexual indulgence. As further proof for this viewpoint we
must remember the small uterus, the hypertrichosis, and the amenor-
rhea lasting three months several years ago.

It would seem to me that the only logical explanation of all cases
of persistent mamma areolata is that of insufficient ovarian function.
Due to this the breast never reaches its full development but stops at
an earlier stage. Furthermore, this explanation is the more easily
tenable if we remember, as stated in the beginning, that the earliest
mammals have no nipples at all and that only in the apes and humans
do we have a differentiation of nipple and areola.

I would be more inclined, also, to attribute the occurrence of the
mamma areolata in the protomorphous races to the same cause rather
than to those mentioned by Hofstaetter. This may seem at variance
perhaps with the general opinion about the pronounced sexual tenden-
cies found in some of the black races but these opinions are mostly
based on observations of the protomorphous races outside of their
wild state. In such cases interbreeding with other races, change of
environment and an abundant food supply, have totally altered con-
ditions. Anyone who is familiar with the peculiar, and often extreme
laws of sexual abstinence found in these races in their indigenous
state, will realize that people with pronounced sexual proclivities
would never make such laws. Besides, the negroes born in civilized
countries do not, as far as my experience goes, have a mamma areolata,
or at least only rarely. We see, therefore, even here no evidence
against accepting an endocrine deficiency as the cause of a mamma
areolata. If this deformity develops secondarily, especially after a
woman has become very stout, I would also think of ovarian defi-
ciency. The same is true in pregnancy where the activity of the
ovary is much reduced.

In addition to the mamma areolata the vicarious menstruation in
my case was also cured by marriage. This occurs at times and is
mentioned in various instances in the literature, as by Scanzoni* who
attributes the same curative power at times to conception and preg-
nancy. To be correct my case really showed not a vicarious, but a
supplementary† menstruation as uterine hemorrhage also was present.

Generally, vicarious menstruation is regarded either as a perverted
ovarian function or an increased ovarian function. The first explanation
is given especially in true cases of vicarious menstruation with or
without hypoplasia or total absence of the uterus, the second in cases
of supplementary menstruation. However, that would not explain

---

*Cited by Roth, who will be found in the bibliography, on vicarious menstruation, at the
end of the article.

†Dorland—Medical Dictionary and Blair Bell—System of Gyn. i, 374.

why we do not get vicarious menstruation after a total hysterectomy with retention of ovarian tissue. Neither would it account for the fact that such hemorrhages do not occur in the so-called normal cases. The ovarian hormone certainly acts on the whole body and produces a general hyperemia. This is shown by the increased tendency to hemorrhage in cases operated upon at the time of menstruation irrespective of the operative locality. In my case certainly we cannot possibly think of an increased ovarian function. As ovarian extract raises blood pressure it would seem rather that cases with vicarious menstruation have a defect or instability of the vascular system* or that possibly a constrictor element normally present in the ovarian extract is lacking.† As the breast is so intimately connected with the uterus and ovaries, this would also coincide well with the occurrence, in these cases, of a mamma areolata where the muscle fibers evidently have not contracted sufficiently. It would be interesting to have statistics on the condition of the breasts in cases of vicarious menstruation and vice versa, and I believe that such statistics would help to increase our knowledge of the endocrine action of the ovary, which at present is still known only very superficially despite all efforts in this direction made so far.

BIBLIOGRAPHY

For the literature on vicarious menstruation which may occur from almost any part of the body, but in about one-third of the cases is represented by epistaxis, see the following:

Amberg: Otitis Interna Sinistra Hem., New York, Arch. of Otol., 1906, xxxv. *Bourbon:* Menstruation Hemorrhage from the Ear, Paris, Jouve et Boyer, 1899, Thesis. *Brothers:* Concealed Menstruation, Med. Rec., Aug. 19, 1899. *Chassat:* Periton. Menstruation, Rev. Med. de la Suisse, Rome, 1920, p. 453. *Davis:* Vicarious Hemorrhage into the Eyes at Menstr. Period, Ophthal. Rec., July, 1897. *Feldman:* Stomach Bleedings of Sexual Origin, Berlin, E. Ebering, 1911. *Friedenberg:* Vicarious Menstruation into the Retina, etc., Hartford, 1903, Am. Ophthal. Soc., 1903. *Keen:* A case where a woman . . . menstruated for eleven years by the rectum, Ann. of Surg., June, 1919. *Pulvermacher:* Three cases of Vicarious Menstruation, Ztschr. f. Gynäk., 1916. *Rinsema:* Herpes Menstrualis, Acta Dermato-Venereol, i, No. 1, 1920. *Rosser:* Endocrine Problems in Pelvic Surg. with Spec. Ref. to Vicarious Menstruation, Endocrinology, 1920, p. 537 and Texas State Jour. of Med., xvii, 290. *Roth:* Vicarious Menstration, Monatschr. f. Geburtsh. u. Gynäk, li, 41. *Schaeffer:* Vicarious Menstruation and its Forensic Importance, Vierteljahrschr. f. Gerichtl. Med. xix, 1. *Sippel:* Arguments Against the Theory of Vicarious or Supplementary Menstruation, Münch. Med. Wchnschr, lxviii, 1678. *Solomons:* Herpes as a Form of Vicarious Menstruation, Dublin Jour. of Med. Sciences, May, 1921.

616 MADISON AVENUE.

---

*The coagulation time of the blood must also be thought of. It was normal in my case.

†The conception of vicarious or supplementary menstruation as a deficient ovarian function receives further clinical evidence from a case reported by E. H. Funk and A. G. Ellis in the "Report of the Jefferson Med. Coll. and Hosp.," 1915, vi, 136. In this case the woman had periodic bleeding (vicarious menstruation) from the mouth, associated with hypoplasia of the uterus and tubes and aplasia of the ovaries and mammary glands.

TOXEMIAS OF PREGNANCY FROM A NEW ASPECT

A Preliminary Report*

By O. M. Gruhzit, M.S., M.D., Detroit, Mich.

GREGORY MENDEL formulated in 1865 laws which govern trans-
mission of hereditary characters from the parents to the off-
spring. Von Dungern and Herschfeld[1] demonstrated in 1909 and 1910
that the transmission of blood group characters obeys the same laws.
In 1921 and 1922 Ottenberg[2] used the blood group characteristics of
parents and their offspring as a means of identification of the parent-
age of the child.

Landsteiner[3] in 1901 postulated the presence of different agglu-
tinating substances specific to each blood group. Decastello and
Sturli[4] in 1902 and Hekton[5] in 1907 proved by the absorption method
the existence of two cell agglutinogens and two corresponding serum
agglutinins. Jansky[6] in 1907 definitely recognized four blood groups.
This was confirmed by Moss[7] in 1910. Further, Von Dungern and
Herschfeld showed that the agglutinogens of the red cells never occur
in the child if not present in one of the parents. The blood group
peculiarities are permanent throughout the life for each individual.
In the embryologic development the specific agglutinating power of
the red cells appears first and is present at birth, while the serum
acquires the agglutinating power after the birth.[4]

It is universally known that the incompatible blood cannot be
used for transfusion. The question arises whether a similar condition
does not exist in a pregnancy where the mother's serum agglutinates
the fetal red cells, and whether incompatibility of mother's and fetal
cell elements does not have something to do with the toxemias of
pregnancy.

With this in view, blood typing was undertaken to determine inci-
dence of incompatibility of the blood of the mother and her offspring
in normal pregnancy as well as in toxemias.

It is to be noted that in every case of eclampsia the mother's and
baby's blood grouping is such as to produce agglutination of the
baby's red cells by the mother's serum. On the contrary, not a single
case of normal pregnancy showed a possible blood grouping which
could result in agglutination of the fetal red cell elements by the
mother's serum *in vivo* or *in vitro*.

Diagnosis of eclampsia clinically is at times very difficult and many

mild cases might be missed entirely, while other cases are easily mistaken for uremia, hysteria, epilepsy, or nephritis. It is just as easy to diagnosticate eclampsia where it should be diagnosed uremia, nephritis, etc., unless the clinical evidence is substantiated by laboratory findings. Eclampsia is more common than is usually thought, especially the milder cases which are not recognized as such. Theoretically there should be one case of eclampsia in about 170 pregnancies. In the University of Michigan maternity clinic, out of 1040 cases delivered during the last four years there were ten cases of eclampsia, i.e., one case of eclampsia in 104 deliveries.

TABLE I

BLOOD GROUPING IN TOXEMIAS AND NORMAL PREGNANCIES

NUMBER OF CASES	MOTHER'S GROUP	CHILD'S GROUP
13	I	I Normal
10	II	II "
10	II	I "
2	III	I "
3	IV	IV "
1	IV	I "
1	I	II Eclampsia
2	II	III "
1	III	II "
1	I	– – " Husband's gr. IV.
1	II	– – Pernicious vomit. Husband's gr. III.

Many hypotheses have been advanced to explain the etiology of eclampsia. However, they do not attempt to coordinate the cause with the symptoms of the disease. To be accepted, any hypothesis must explain the associated symptoms of albuminuria, edema, headaches, rising blood pressure, convulsions, increased viscosity of blood, coagulation thrombi in the capillaries, and the focal necroses of liver, kidneys, and the brain, as well as the occurrence of antepartum, intrapartum and postpartum eclampsia.

In the few cases of eclampsia under consideration, the mother's serum agglutinated her baby's red cells *in vitro*.

It is presumed that the waste products of the fetal metabolism pass into the mother's system for disposition. It is also presumed that the fetal agglutinogens will be agglutinated *in vivo* of the mother's system as it would occur if transfusion would have been done of incompatible blood, or as it occurs in the test tube. These two presumptions together with the clinical signs of eclampsia aid materially to explain the symptoms of the disease.

The noticeable signs and symptoms of an eclamptic attack appear towards the later stages of pregnancy, i.e., at the time of the most rapid growth of the fetus. The increased anabolic process goes hand in hand with increased rate of catabolism. Increased amount of waste

products, including the waste products of the blood system, are thrown or diffused into the mother's system. Whether the specific agglutinating substance is passed to the mother's system in the waste products as an albumin molecule or as a hypothetical "agglutinogen," is not known. In the fetal body it is associated with the red cells. When in the mother's blood stream, it is agglutinated and suspended as fine colloidal particles. A new colloidal state of the blood is produced which probably accounts for the more viscous, "thicker," blood of the eclamptics. This new state of the blood is the paramount factor of the disease. The physical and chemical processes which associate with a colloidal substance in the blood stream may readily explain the signs and symptoms of eclampsia.

The mechanism of the heart has to speed up to pump the thicker, colloidal blood. Further, the osmotic pressure is increased in the blood vessels as colloids have great power to adsorb water. This results in increased blood volume as well as blood pressure. These effects of colloids in the blood stream have been amply demonstrated by Baylis,[8] Erlanger and White[9] and Kruse,[10] while working with colloids, as acacia, gelatin, etc.

The more water bound up and kept in the blood stream, the less there is eliminated through the kidneys, though the blood pressure may be high.[11] The other symptoms of eclampsia, as headaches, edema, and the muscle phenomena, are the direct result of the eclamptic syndrome of the increased viscosity of the blood, the high blood pressure, and the increased blood volume. These factors produce edema as a result of congestion and stasis in all organs of the body, including the brain; and when, according to Erwin,[12] the intracranial pressure approaches that of the blood stream, the convulsions with the eye symptoms appear.

This condition is further complicated by the reduction of the alkali reserve of the blood plasma due to the pregnancy itself, but more exaggerated during the eclamptic period, as shown by White[13] and Killian and Sherwin.[14] The decreased alkali reserve of the blood is followed by reduced oxygen-carrying capacity of the latter. The lack of oxygen not only embarrasses the central nervous system, but materially slows up body function in general and probably aids in the formation of agglutination thrombi, as the increasing acidosis assists flocculation of the colloidal substances.

It is probable that the agglutination thrombi in the capillaries of the liver lobules, kidneys, brain, and elsewhere, have similar origin as we see in the isoagglutination tests. The flocculus at first are small, but when forced together by slight shaking, they form large clumps. In the blood stream they are probably just large enough to plug the small capillaries of the liver, kidneys, and brain.[15] The stoppage of

the capillaries not only produces the focal necrosis of the particular organ involved, but aids in the stasis, congestion, edema, retention, increase of blood pressure, and convulsions,—the vicious cycle of eclampsia.

SUMMARY

The hereditary *anlage* determines the blood group of the offspring. This same *anlage* determines whether the mother's blood agglutinates the fetal or not.

In this preliminary work on eclampsia it has been found that the mother's serum agglutinates her baby's red cells *in vitro*. It is presumed that such agglutination may occur *in vivo* of the mother's blood stream resulting in a "thick," viscous blood.

The symptoms and pathology of eclampsia may readily be explained on the basis of the "thick," viscous colloidal state of the blood.

BIBLIOGRAPHY

(1) Ztchr. für Immunitatsforsch., 1909-10, iv, 531; 1910, vi, 284; 1910-11, viii, 526.   (2) Jour. Immunology, 1921, vi, 363; Jour. Am. Med. Assn., 1922, lxxviii, 873. (3) Wien. klin. Wchnschr., 1901, xiv, 1132.   (4) Muenchen. Med. Wchnschr., 1902, xlix, 1090.   (5) Jour. Infect. Dis., 1907, 297.   (6) Sbornik Kliniki, 1907, viii, 87. (7) Bull. Johns Hopkins Hosp., 1910, xxi, 63.   (8) Jour. Pharm. and Exper. Therapeutics, 1920, xv, 29.   (9) Am. Jour. Phys., 1920, liv, 1.   (10) Am. Jour. Phys., 1919, xlix, 137; 1920, li, 198.   (11) *Lyon, D. M.:* Quart. Jour. Med., 1921, xiv, 398.   (12) *Erwin, D. M.:* Jour. Am. Med. Assn., 1918, lxx, 1208.   (13) Brit. Med. Jour., 1920, iii, 976.   (14) AM. JOUR. OBST. AND GYNEC., 1921, ii, 6.   (15) *Jardine, R. and Kennedy, A. M.:* Obst. Transactions, Edinburgh, xv, 90.

THE MANAGEMENT OF THE THIRD STAGE OF LABOR

BY CHARLES A. GORDON, M.D., F.A.C.S., BROOKLYN, N. Y.

THE problem of the management of the third stage of labor has by no means been solved. A careful survey of present-day knowledge shows that not even in the fundamental principle of care is there unanimity of opinion.

To the average person treatment of the placental stage seems simple, for delivery is complete with the birth of the child. The placenta is literally the afterbirth. The treatment may be anything from immediate Credé to hasty manual removal, yet De Lee tells us that more women die from accidents of the third stage of labor than during the other two stages combined. The easy problem evidently has a different solution.

We believe that interference with the normal mechanism of separation, whatever that may be, is the commonest cause of retained placentas, postpartum hemorrhage, and infections.

Some of the great teaching clinics fail to impress students with the

importance of the expectant treatment of the third stage of labor. Much time may be spent upon the mechanism of separation, and little time upon the recognition of the clinical phenomena accompanying separation. Modern textbooks, too, with but one or two exceptions, are not precise or clear in their discussion of treatment. The tendency has been to fix arbitrary time limits upon this stage, without making provision for the cases which fail to come within the limit. A loose terminology is largely responsible for misunderstanding. Above all, for some unknown reason, the method of Credé is more deeply impressed upon our minds than any other operative procedure in obstetrics; it is apt to be the first postpartum thought.

Credé,[1] absolutely ignoring the fundamental necessity of separation before expulsion, pressed out the placenta in his first 2,000 cases with the second or third contraction in an average time of four and a half minutes. He had retention of the entire chorion in 18 cases, and partial retention of the chorion in 78 cases. Later he changed his technic so that expression was not done until fifteen minutes had elapsed.

A great many explanations as to the exact mechanism of the separation and expulsion of the placenta have been offered. These have been largely theoretical, some depending upon frozen section work, others upon cesarean section or examinations made during operative deliveries. Practically all agree that the placenta is expressed according to the mechanism of Schultze or that of Duncan. Briefly, the Schultze mechanism (1865) requires the formation of a retroplacental clot with escape of the placenta, fetal surface first, through the membranes. Matthews Duncan, in 1871, asserted that the placenta first separated at the edge, without retroplacental clot, and escaped edgeways, maternal surface first.

The mechanism is of more than academic interest, for its application is of vital importance in the management of the third stage of labor. Freeland, in a study of 2,600 cases at the Rotunda Hospital, noted Schultze mechanism in 2,145 and Duncan in 465 cases. In the 2,145 Schultze cases the membranes were incomplete in only 108, or 5 per cent; whereas, in the 465 cases of Duncan mechanism the membranes were incomplete in 70, or 15 per cent. There were in this series 28 cases of antepartum hemorrhage, in every one of which the mechanism was Duncan. He concluded, therefore, that the mechanism described by Duncan was almost pathologic, the separation at the edge actually occurring in antepartum hemorrhage or being artificially caused by massage of the uterus. Polak, in 2,000 cases, arrived at similar conclusions.

The general impression is that delivery of the placenta is commonly effected by Schultze's mechanism, yet we will all agree that abdom-

inal massage is the commonest method of management of this stage of labor. Either, then, massage does not influence the mechanism, or if it does, Schultze's method is pathologic.

For practical purposes, is it not a fact that separation is due to a contraction in the placental site, in which the whole uterus does not share? Perhaps the details of the mechanism vary with the location of the placenta, its size and shape, and the size of the uterus.

This controversy has, at different times, enlisted many obstetricians. It seems to me that the work done in 1918 by Weibel[2] in Wertheim's Clinic is epoch-making in character. Forty-six women were delivered on an x-ray table with lateral and dorsal plates in position. As soon as the child was born, the cord was quickly cut and the maternal end injected with 60-80 c.c. of Lilienfeld's *Kontrastin*, a quantity which he found sufficient to fill the placental veins without escaping, as it does in the so-called turgidization of the placenta. Serial pictures were taken with astonishing results. Often, a picture taken one minute after delivery would find the placenta already separated. In 21 cases he was able to follow the placenta from separation to expulsion. In these cases separation began at different points or all at once over the whole placenta. In 19 of the 21 cases the placenta passed through the contraction ring end first, as Duncan described. There was commonly a delay in the separation of the membranes, whatever blood there was serving to separate them, and not the placenta. Passage of the detached placenta through the external os, vagina and introitus depends upon the length and adherence of the membranes and the size of the birth canal and the usual deflection of a passenger. It is true that Weibel's series is small in number, but the uniformity of his results, and the exactness of his method of research make it highly probable that we must radically reverse our views on this subject. Warnekros, in Bumm's Clinic, has been conducting a similar study.

We have reviewed the third stage in 1,600 cases of labor occurring under our supervision in St. Catherine's Hospital.

As soon as the babe is born, a tell-tale tape tie is loosely placed upon the cord, at the vulva. The fetal end of the cord is not clamped, but is closely tied when pulsation stops.

The abdominal coverings are then removed and the patient is carefully scrutinized for the practical picture of separation. In the abdomen, after a physiologic period of inertia, the uterus rises above the umbilicus, not relaxed or soft, but firm in the upper segment. The lower uterine segment may be distended over the pubes, although this sign is not constant. A detached placenta half way through the upper segment into the lower, or protruding through the lower uterine seg-

ment into the vagina, may not distend the uterus. Descent or advance of the cord with its tape tie from 10 to 15 cm. is constant.

Together with these two signs the patient is instructed to bear down. If she has a diastasis of the recti muscles, these muscles are firmly held together after the method of Baer, and she is again asked to bear down. If this is not effectual, one hand on the fundus of the uterus, not squeezing, but pushing the uterus straight down the vaginal axis, expresses the placenta by the piston method. If all these methods fail, we catheterize the bladder, if need be, and with the uterus firmly contracted, try Credé, using anesthesia if necessary.

The membranes are treated expectantly without torsion. The time for separation is as important as that for the placenta itself. Traction may be done only after partial descent of the membranes.

If the placenta is still retained, or if it has not yet separated, the cord is cut just within the vulva, leaving the tell-tale tie in its place. Pituitrin is not given. The patient may then expel the placenta herself, or subsequent Credé may express it. Nothing further is done unless hemorrhage occurs, when Credé, under anesthesia, is done or, failing in that, the placenta is manually removed.

There are, of course, exceptions to this rule, but it is obviously no more possible to conduct the third stage of labor by rule than it is to conduct the first stage.

If, upon our routine inspection of the placenta, large pieces were missing, I believe we would remove them manually. So far, we have not had to do this; membranes or small pieces of placenta are left for spontaneous expulsion.

In this series of 1,600 cases pieces of membrane have been retained four times, without any disturbance other than the pain incidental to their expulsion in a clot. There were nine cases of twin pregnancy with one placenta, five with two placentas, in none of which was there placental retention or postpartum hemorrhage.

We have met with four cases of placenta succenturiata, in all of which the accessory placenta came with the membranes and was not retained. A piece of placenta about 6 by 8 cm. remained in the uterus for four days, following manual removal during cesarean section for placenta previa. Even with pain and sharp hemorrhage on the second day, its presence was unsuspected. It was easily expelled on the fourth day with some further loss of blood and no rise of temperature.

The entire placenta was retained for more than two hours in ten cases. In two cases it was retained for three hours, two cases for fourteen hours, and two cases for twenty-nine hours. There was at no time more than the usual bleeding. In every one of these cases the placenta was thought to be separated and was fully expressed

by Credé without anesthesia. In the seventh case, in which the placenta was retained for ninety-six hours, Credé was successful, but not until considerable blood had been lost. There were two cases of manual removal of the placenta. In one, a case of hydrocephalus with craniotomy, the placenta was retained for sixty-six hours, when hemorrhage occurred. The placenta was found to be partially separated and was easily removed. This patient's convalescence was stormy, complicated by pyometra and persistent subinvolution. In the ninth case the placenta was retained for twelve hours when alarming hemorrhage occurred. Transfusion was done and the placenta removed piecemeal with some difficulty. The postpartum course was normal, without temperature. We believe that this placenta must have been separated at some point, for Ahlfeld has pointed out that a completely-attached placenta cannot bleed. However, no point of detachment was found, and we consider this a true adherent placenta. In our last case, a primipara, after normal delivery, the placenta was retained for twelve hours, when death took place suddenly. There had been no hemorrhage and less than average blood loss. At autopsy it was thought that death occurred from acute dilatation of the heart. A small calcareous placenta could not be separated from the uterine wall. The pathologist reported placenta accreta. We feel sure that in this case death was not due to retention of the placenta.

In this series there were fourteen cesarean sections, one of which was done for abruptio placentae, and another for placenta previa. In placenta previa treated by the vaginal route, failure to express should be followed by manual removal.

In conclusion, we believe:

1. The recognition of separation is of great importance. 2. The frequent occurrence of speedy separation is responsible for the success of Credé. 3. Indiscriminate use of Credé will surely cause the very end-results which that operation is designed to avoid. 4. Students should be taught that Credé is for the pathologic third stage. 5. Retention often occurs in the lower birth canal, due to the recumbent posture of the patient and inability to use her abdominal muscles which are then chiefly concerned in expulsion. We see no reason why the primitive sitting posture could not be revived for delayed placentas. 6. The placenta may safely be retained for many hours. 7. The adherent placenta is rare: it causes no bleeding until partial separation occurs. 8. The completely separated placenta causes no bleeding. 9. The partially separated placenta always causes bleeding. This is the placenta which calls for manual removal. 10. Manual removal carries a high mortality, but it has a distinct indication—hemorrhage. Delays are dangerous after hemorrhage occurs.

Detailed studies of the management of the third stage of labor are not easily found in the literature. From our point of view, we found nothing so practical or precise as Polak's study in 1915.[3] We hope that the work and deductions of Weibel will stimulate interest in the placental stage of labor, so that its management may be more clearly defined for us all.

REFERENCES

(1) Archiv. f. Gynäk., 1881, xvii, 260.   (2) Arch. f. Gynäk., 1919, cxi, 413 507.
(3) Surg., Gyn. & Obs., 1915, xxi, 590.

256 JEFFERSON AVENUE.

THE PATENCY OF THE FALLOPIAN TUBES ASCERTAINED BY TRANSUTERINE INJECTION OF FLUIDS*

BY I. S. STONE, M.D., WASHINGTON, D. C.

SINCE the introduction of air or gas into the peritoneal cavity by way of the fallopian tubes has become a popular method, following the suggestion and practice of Rubin of New York City, it may be of interest to know that tubal irrigation through the uterus has been practiced by the writer and some of his colleagues and assistants since its first use in 1896. The only allusion to the method which has been published by the writer may be found in the Transactions of the American Gynecological Society for 1909 in a discussion of papers by Dr. Boldt and Prof. Hoffmeier on "Conservation of the Pelvic Organs."

The method was first tried during an operation upon a young woman with acute salpingitis and appendicitis with extensive pelvic peritonitis. We were impelled to pursue a conservative course in this instance because the patient was expecting marriage in the near future. At that time it was considered folly to leave a tube which was "dripping with pus," yet we allowed the left tube and corresponding ovary to remain in situ, although the specific nature of the infection was beyond question (the responsible party confessed it). After opening the abdomen and removing the right tube and ovary with the appendix, all of which were hopelessly destroyed, we proceeded with the injection. The cervix uteri was caught with a tenaculum forceps, a large glass syringe filled with hot mercuric bichloride 1-1000 was introduced into it and passed through the internal os. Firm pressure with the hand caused a small stream of the solution to appear at the pavilion which was caught upon a sponge and not allowed to flow

into the abdomen. Besides the transuterine irrigation of the left tube the same solution was used to irrigate its distal end by distention and flushing until we reached every possible fold in its mucosa. After a stormy first night the patient recovered, was married and bore her first child nine years afterward and a second child two years after that. The lady and her two daughters are now living and in excellent health.

Since then tubal injections have been practiced at Columbia Hospital in this city, especially since iodine has come into general use as a sterilizing agent.* In some instances the injection has been made just before opening the abdomen in an effort to secure a better technic, but as a rule the incision is made first. Inhibiting solutions have as a rule been used and we are not informed if the full strength tincture of iodine has been used in any case. We are not aware of any complication as a result of this procedure nor have patients suffered additional pain. There is always a rise of temperature after "pus operations" and we cannot decide that it is ever caused by these injections. We have not heard of a single instance of accident or even anxiety due to these injections since iodine has been used.

In a few instances we have tested the patency of the tubes in cases of sterility. In our last case the patient had been married for six years without conceiving. During the greater part of this time she had an uncontrollable leucorrhea. When she came under my care the discharge persisted after resorting to the customary treatment, including curettement. The husband was found competent in every particular and in absolutely perfect health. The use of bismuth injections appeared to benefit the patient but we determined to investigate the condition of the tubes as the patient was very anxious to have a child and willingly consented to have her abdomen opened. It is possible that the isthmus was the seat of the obstruction or infection in this case for the patient conceived three months after leaving the hospital and her child is now two years old. In some instances we have failed to succeed in passing some obstruction in the tube, the force being hand pressure as mentioned above. The cornua and the narrow portion of the tube including the isthmus have hitherto been considered beyond reach of our usual methods. Is it not a fair supposition that some method of reaching this area would enable us to deal with the infection or obstruction which has left a patient hopelessly sterile? Attempts at reaching the remote cornua and isthmus by curette or probe have failed, while it remains to be determined if distention of the tubes with gas will prove to be successful in relieving sterility.

---

*It is quite possible that tubal injections *given without opening the abdomen* may return to professional favor, if so let no one think himself a pioneer who tries it, for the literature of German medicine contains a report of an operation of this kind written half a century ago.

There is no ground whatever for fear of forcing infectious tubal contents into the peritoneal cavity when fluids are used as described above. In any case with pus in the tubes the peritoneum is either infected or shut off by protective adhesions, while by our method the tubes are held in view upon a sponge outside of the cavity before the irrigation begins.

A word of comparison between the efficacy of the two tests for patency remains to be said. The visible evidence of patency determined in appropriate cases with the abdomen open is gratifying and definite. To this it is quite possible that a measure of, or even complete sterilization of the mucosa of the isthmus has been added, while with gas we could not hope for such a result. Again we know that the introduction of gas into the cavity will only prove one tube to be open and we still would be uninformed as to the condition of the fimbria which may be sufficiently open for the passage of gas under pressure and yet be incapable of performing their function. We are confident, however, that the proof of the actual presence of tubal obstruction by the recent use of air or gas will prove an illuminating aid to the study of sterility, a subject which has hitherto not received the attention to which it is entitled as we can observe very little if any better results by modern treatment than by former antiquated methods.

STONELEIGH COURT.

PHENOLBARBITAL SODIUM (LUMINOL SODIUM) TREATMENT FOR HYPEREMESIS GRAVIDARUM*

BY RALPH LUIKART, M.D., F.A.C.S., OMAHA, NEBR.

THE successful treatment of hyperemesis gravidarum with phenolbarbital sodium seems worthy of record because of the hitherto unsatisfactory therapy of this condition and because of the important bearing of severe vomiting in pregnancy upon fetal and maternal life. These observations presage a wide field of therapy for this drug in emesis from various causes. Under hyperemesis gravidarum are included those cases of persistent vomiting which have no definite pathology and for which no cause for the vomiting other than the pregnancy can be found.

Recent studies suggest that the underlying factors of hyperemesis and its complications are to be sought in some toxemia, depending on disturbed hepatic function. The weight of evidence favors the view that the liver when underfed,—i.e., when its glycogen content has

become low as occurs in mild vomiting,—is a poor detoxifier and thus a vicious circle becomes established.   Therefore, it would seem reasonable to assume that if the patient could be made to retain and assimilate food, the chain of events which frequently develops into hyperemesis gravidarum could be avoided.

It has long been known that patients suffering from this malady retain and assimilate food given shortly after a hypodermic of morphine, codein or heroin, and that a few such feedings thus obtained sometimes save the life of the patient; but because of deleterious after-effects the number of cases in which these narcotics can be used is decidedly limited.

The intravenous use of glucose seems a more rational procedure. It has been used with excellent temporary results and occasionally with permanent cure.   However, in those cases where vomiting is protracted it is not feasible to keep up the patient's nutrition by intravenous glucose feeding.   Furthermore, the reactions are often severe.

C. E. Paddock* has recently advocated feeding by the duodenal tube, which in his hands has given satisfactory results.   While not controverting his conclusions I should feel that this method, because of its unpleasantness to the patient, because of the difficulty of its application in those suffering from extreme nausea and because of the rather frequent difficulty of introducing the tube, renders this means of giving nourishment one of last resort, rather than one of election.   The present vogue in the use of the duodenal tube for biliary drainage has emphasized the difficulties which may be anticipated.   In skilled hands the passage of the tube in patients not suffering from nausea is only sixty to eighty per cent at the first trial.

It would seem that a drug which would allay vomiting and nausea long enough for food to be taken and assimilated and yet have no markedly deleterious effects would be ideal.   Phenolbarbital sodium in our hands has been such a drug.   The use of phenolbarbital sodium is not an immediate cure for hyperemesis gravidarum, but a relief to such an extent that the patient can often be carried to the end of the third month of pregnancy with her weight and general strength but little impaired.   Thus the desired end is gained in that we have a woman in practically normal health and a live fetus in utero at the end of the period of intoxication.

The method is as follows: Phenolbarbital sodium, gr. 1 to 2, is administered hypodermically, the pure or powdered form only should be used, as the milk sugar in the tablet triturates will often cause abscesses.   Administration every four hours will suffice in the majority of cases, though it may be given at shorter intervals for three or four

times if relief is not prompt. If the case is seen early, regular feedings are continued—six a day. Great care must be taken with the general management. There should be examinations of urine, a record of total intake and output of fluids, blood pressure determinations daily, pulse, temperature and respiration records.

If the patient is starved and there has been considerable loss of weight and strength, then feeding should be along the following lines: Eskay's food, invalid formula, two ounces every hour; carbonated water, or tap water, if preferred, midway between feedings. The bowels should be evacuated by cathartics, calomel and a saline, such as Karlsbad, sodium phosphate, etc., preferably, and should be made to move daily, if necessary with help of enemata. Fluids are given, Fischer's solution, saline, per rectum, as needed to supply water and alkali reserve. Visitors are not allowed and the room is darkened. When the patient asks for food frequent feedings in small quantities are given. The amount and kind of food is determined by the manner in which it is retained. Eventually regular meals are given, when a hypodermic dose of phenolbarbital sodium should be administered fifteen to twenty minutes before the meal. As food and water are taken and retained the mental and physical condition improves rapidly. If the case is obstinate, treatment may need to be continued until the end of the third month of pregnancy.

The sensation caused by phenolbarbital sodium is described by patients as a "fluid feeling" of the entire body.

Occasionally the patient becomes a day sleeper and complains of wakeful nights. A hypodermic of seven grains of caffein sodium benzoate administered with the phenolbarbital sodium helps to overcome this, and does not interfere with the quieting effect on the nausea of the phenolbarbital sodium. A cup of coffee serves the purpose somewhat less satisfactorily. The only untoward effect of phenolbarbital sodium observed has been urticaria. This is relieved to a large degree by sponge baths of 1 per cent lysol solution, as needed.

CASE I.—Mrs. H., twenty-seven, para ii. The family history was negative, except all were highly nervous. She was anxious to have a child, the child of the first pregnancy having died of diphtheria when fifteen months of age.

During the first pregnancy, which was three years ago, vomiting was severe to the end of the third month, and this confined the patient to bed most of the time. The delivery was normal. One year later the appendix and tonsils were removed.

The patient became pregnant while on a trip to Cuba and at once began vomiting in the morning. She was then about fifteen days past her first missed period. The vomiting grew constantly more severe, and she became bedfast.

On examination the blood Wassermann and spinal fluid were negative; blood sugar 0.08 per cent. Uterus in good position, cervix not eroded. Teeth excellent.

Treatment.—The patient was kept in bed, on dry diet, given in small quantities at frequent intervals; fluid was given only by rectum. Bromide and chloral in large doses were administered by rectum. Under this treatment for a period of ten days

the patient grew gradually weaker and her vomiting increased in severity. She was then taken to a hospital and treatment continued along the same lines. In addition to the dry diet she was allowed ginger ale, thirty minutes after feedings, for which much has been claimed by some obstetricians. In addition to the chloral and sodium bromide, she received corpus luteum intravenously (Armour's), beginning with 1 c.c. a day, and after two days increasing to 2 c.c. for a second period of two days, and subsequently to 3 c.c. per day. As no relief was obtained cocain was given by mouth and also bismuth subcarbonate and cerium oxalate. Later adrenalin and placentin were tried by mouth. The patient became progressively worse, until she retained no fluid by either mouth or rectum. On the eighteenth day of treatment she vomited clear fluid and bile continuously for a period of five hours, and again the next day. Her bowels were kept open with difficulty. Her blood pressure fell to 90, pulse 98; the urine contained acetone 1 +, was slightly acid, of a specific gravity of 1030, with a trace of sugar; no diacetic acid was present.

In this serious condition gastric lavage was given and 500 c.c. of sodium bicarbonate solution was left in the stomach. A measure of relief was gained, but vomiting soon recurred. An intravenous administration of 900 c.c. of 10 per cent glucose was given slowly during a period of two hours. Care was taken to maintain the solution at body temperature. It was hoped that by following minutely Woodyatt's directions the reaction might be minimized. In this we were not disappointed, but our glucose unfortunately was largely and promptly eliminated by the kidneys, notwithstanding the fact that we had taken pains to give less than 0.8 gm. per kilo of body weight per hour. However, the immediate effect of the glucose treatment was favorable. The blood pressure rose to 110; indeed, the improvement so impressed the patient's friends that they insisted, against advice, upon removing her from the hospital. This proved unfortunate, for though her home was comfortable and she had a private nurse, she failed to maintain her improvement and vomiting grew gradually worse. Corpus luteum, which had been discontinued, was resumed, but seemed to increase her vomiting. Thyroid extract, gr. i, t. i. d., gave temporary relief, but failed after a few days' trial. Her pulse reached 100, temperature 99°; the urine, of a specific gravity of 1030, contained acetone and sugar; the ammonia co-efficient was normal. There were no signs of nephritis at any time. The patient became slightly jaundiced; she retained nothing by mouth or rectum, and the loss of body fluids became so extreme that she appeared actually desiccated. Recourse was again had to glucose, all of which was found by quantitative analysis to be eliminated in the urine within thirty-six hours. The patient was returned to the hospital. A consultant suggested cauterization of the cervix and for psychic effect his advice was followed. The patient became progressively worse, weak, restless and sleepless, and gave up hope of being able to go on with the pregnancy. At this juncture Dr. Ernest Kelly suggested phenolbarbital sodium to relieve her mental distress and sleeplessness. The results were striking. Phenolbarbital sodium brought forth immediate results, for the patient promptly and steadily improved, and her depression ceased. It was at this point that I made the observation that *after each dose of phenolbarbital sodium the patient's vomiting ceased for from two to three hours*. Liquids began to be retained and even solid food could be administered in small amounts at frequent intervals. Within three or four days the patient asked for a full tray, began to eat regular meals, and improved rapidly. An early attempt was made to omit the phenolbarbital sodium, but she promptly vomited the food ingested, and therefore the phenolbarbital sodium was resumed. Later the dosage was reduced with no recurrence of vomiting. Her nutrition improved rapidly and finally the phenolbarbital sodium was reduced to a bedtime dose. This proved necessary to prevent early morning vomiting for a time. An occasional tablet by mouth, of 1½ grains, was found necessary to re-

lieve early morning vomiting even after the third month. At the time the phenol-barbital sodium treatment was instituted, her weight was 82 pounds. Her normal weight was 98 to 103 pounds. After twenty days' treatment her weight was 93 pounds. The patient recently went through with normal labor and had a healthy child.

CASE II.—Mrs. D., age twenty-three, para 1.

The physical examination and Wassermann were negative. She complained of nausea and constipation. Corpus luteum was given a fair trial, with no results ex-cept urticaria. Cocaine, bismuth, calomel and saline with bromide, gr. 90 and chloral, gr. 40, per rectum each day, etc., were given, without effect. (At this juncture my experience with phenolbarbital in Case I occurred.) As soon as the phenolbarbital sodium treatment was begun the nausea and vomiting ceased, the intake of food and water increased, and the patient held her weight. The patient's condition was practically normal at the beginning of the fourth month, except for an occasional morning nausea. Caffein sodio-benzoate was used successfully to prevent day sleep-ing.

Hypodermic injections of phenolbarbital sodium have been given to some twenty patients with vomiting from various causes, some with prolonged vomiting follow-ing anesthesia, with immediate cessation.

SUMMARY

1. Phenolbarbital sodium allays nausea and vomiting, and permits the ingestion and the assimilation of food under conditions of per-nicious vomiting.

2. Hypodermic administration is necessary for satisfactory results.

3. Phenolbarbital sodium has proved successful in hyperemesis gravidarum when intravenous corpus luteum, intravenous glucose, and duodenal feeding have failed.

4. The dosage of the phenolbarbital sodium may be diminished, or even suspended, as nutrition and water balance become normal.

5. During the three months of hyperemesis gravidarum treatment may be continued with varying dosage of phenolbarbital sodium without ill effect.

6. The measures hitherto employed for hyperemesis gravidarum. such as intravenous glucose and duodenal feeding, are susceptible of only temporary exhibition.

CONCLUSION

Phenolbarbital sodium has proved. in our limited experience, to be the best sedative yet advanced to control hyperemesis gravidarum.

808 BRANDEIS THEATRE BLDG.

OBSTETRICO-GYNECOLOGICAL DIAGNOSIS. THREE UNUSUAL CASES*

By Adam P. Leighton, Jr., M.D., Portland, Maine

CASE 1.—*Hematosalpinx.* Miss K. L., a trained nurse and hospital executive, age twenty-five years. Past history, children's diseases only and in good health up to 1915, when appendectomy was done for acute appendicitis. This was evidently considered a "clean" case for the incision was tightly closed. On the tenth day after operation, a large quantity of pus was discharged through the wound. This so-called "stitch abscess" drained profusely for two to three weeks. Recovery was slow and it was a year before the patient could resume her hospital work. In 1918, she was operated upon again, following symptoms of continuous abdominal pain, with rapid loss of weight. "Adhesions were broken up" according to her statement and the left tube was removed. Good recovery followed with health and weight quickly regained.

On June 12 of this year, she suffered an acute attack of pain in the right adnexal region. No temperature or vomiting. She was confined to her bed for several days, but recovered quickly and resumed her hospital duty. On July 12, just before starting from her home in Worcester, Mass., to spend her vacation at Old Orchard Beach, Maine, she had another attack of pain in the lower right quadrant, much more severe than previous attacks. There was vomiting and extreme distention, but no rise of temperature. Diagnosis was made of intestinal obstruction. By enemata, however, the distention was relieved. Ten days later, having seemingly recovered to such a degree as to allow her to travel, she came to Old Orchard. The next day, July 23, I was called from Portland to see her. The history was given me just as I have related. Her menstruation had been regular and normal. When I saw her, she was suffering acute pain and was extremely sensitive over McBurney's point. There was pallor, abdominal distention and her temperature was 101°, the pulse 110 and respiration 42. I had her immediately removed to my hospital. The white count was 15,000, hemoglobin 50 per cent, urine negative and lungs negative. Blood pressure was 118/74. It certainly had the ear marks of an "acute abdomen" but I decided to temporize. Hot fomentations and enemata with salines gave relief and excellent results, with relief of distention. She was decidedly improved. The next day, July 25, she was comfortable up to the late afternoon, when there was a sudden return of pain, followed by collapse. Temperature 103°, pulse 132 and respiration 44. Laparotomy, with gas-oxygen anesthesia was immediately performed through a median incision. The abdomen was filled with fresh blood and blood clots. I did not think she would live to be taken from the table. The network of adhesions made it extremely difficult to reach the pelvic cavity. The right tube and ovary were removed. Two cigarette drains left. Macroscopic examination of tube showed marked distention due to a large organized blood clot. There was no tubal rupture. The abdominal end of tube was open, with partial extrusion of the blood clot simulating tubal abortion. In the center of the clot was a small amount of foul-smelling pus. Microscopical examination showed an old chronic salpingitis but no sign of decidua or decidual reaction. It was a typical hematosalpinx. There

was a copious discharge of pus for three weeks, the wound healing well and the patient making a good recovery.

Here was a case wherein the appendix had been removed and later a secondary operation was done on account of adhesions which evidently caused obstructive symptoms. I had never seen the girl before and the picture when I first saw her, was anything but one of possible ectopic pregnancy. She was septic. She had an increased white count. Her pain was exquisite over the old appendiceal scar. One would recognize obvious localized peritonitis and possibly consider stercoral ulceration with perforation, ovarian cyst with twisted pedicle and almost anything except to connect her symptoms with any adnexal difficulty. When she went into collapse and showed the extreme pallor and had prostrating pain, I confess I did consider ectopic rupture. All this, however, was with a history of regular menstruation. When the abdomen was opened and the hemorrhage found, the picture was complete. The microscope disclosed a hematosalpinx. I have often seen some free blood in the peritoneal cavity when operating for the removal of an unruptured pregnant tube and of course, when an ovum is near the fimbriated end and the tube is in the way of aborting it into the pelvic cavity, there may be a considerable amount of intrapelvic bleeding and the case simulate tubal rupture. My explanation is, that even at the first attack of pain on June 12, there was considerable hemorrhage from some eroded vessel in or near the fimbriated end of the tube. A primary hematocele was formed. A month later, a fresh hemorrhage took place pushing the blood tumor further up into the abdomen and then came the last and most severe attack of pain, with collapse and exsanguination, due to the same reason, complicated with coincident pelvic and abdominal infection from the pus collection in the tube.

CASE No. 2.—*Dermoid cyst simulating pregnancy.* Miss F. B. Age nineteen. Patient presented herself at my office on May 10, of this year. Said she had a "swelling" in her abdomen. Past history: Had influenza in October 1921, followed by empyema with subsequent rib resection. Made a slow recovery. Menstrual history: Onset at thirteen years of age, three to four-day type and rather irregular. Menstruated in October and November. Up to the time of consultation, she had menstruated but once since November, although there was a slight flow in early April. External examination disclosed a symmetrical abdominal tumor, corresponding in size and height to a twenty-eight weeks' pregnancy, rising to about three fingers' breadth above the umbilicus, which had been of slow regular growth, obvious to the patient since February. Attempt at vaginal examination showed an unruptured hymen with digital insertion impossible. There was a well-marked pigmentation of the primary areola and Montgomery's tubercles were present. Colostrum in good amount was easily expressed from both nipples. She said that she had been nauseated most of the time the past six months. Fetal heart was not present. The mass was tense to the touch and resembled hydramnios. She stated that the mass was "sore" and she was "lame" across the abdomen. Her temperature was 101°. She emphatically denied any attempts at sexual intercourse. The picture was one of undoubted pregnancy, however, and I sent her home to her family physician with a diagnosis of intrauterine death of fetus. The growth had been too slow for hydatidiform mole and there was no suggestive vaginal discharge. The physician telephoned me, the next day from a nearby town where the patient lived and confirmed the diagnosis and even assured me that he and the girl's father knew the fellow who was responsible. Her father had been "suspicious" of his actions for some time. A thrashing was administered to the boy by the irate parent. A day or so later, the doctor and the father of the girl arrived at my office, bringing the girl with them, and desired that I make some arrangements

for her care at time of confinement. I took her to the hospital for observation with the expectation that labor would soon take place or that the uterus would have to be emptied. Her temperature ranged between 100.6 and 102. The pain increased in severity. Blood count showed 24,000 white cells on May 21, and on May 25, the count was 31,000. Upon questioning the girl, she confessed to attempts at sexual intercourse and stated that there had been seminal deposition upon the external genitalia. I gave her an anesthetic, ruptured the hymen and made a vaginal examination. The cervix was elongated, conical and normal to the touch and far from the feel of the cervix of pregnancy. I began to waver in my diagnosis. The pelvic brim was well filled with a mass similar to the engagement of the lower uterine segment. No body of a nonpregnant uterus could be felt. The next day, I opened her abdomen with the idea of exploration to ascertain the cause of the intense localized pain in the left lower quadrant. I found a large dermoid cyst of the left ovary. It was everywhere adherent to peritoneal surfaces and the omentum. Incision was made into the tumor and about six quarts of fluid resembling pea soup was drained off. There were two large wads of hair as large as one's two fists and hundreds of little balls of sebaceous material, slightly larger than peas. The tumor was peeled off and removed. Drainage was left for three weeks and she made a good recovery. I have prided myself that I could diagnose pregnancy and have laughed at the mistakes of my colleagues, when in the last half of pregnancy, the diagnosis has been one of tumor. I have also seen infinitely better men than I, open the abdomen on a pregnant uterus when they contemplated removal of an abdominal neoplasm. Here was a girl whose menstrual history, plus the possible opportunity for pregnancy being present, had in addition, deep pigmentation of the areola and a considerable quantity of colostrum in the breast. It looked to me like fetal death in the uterus coupled with a sapremia. I have never seen colostrum present in such an amount, in a case of abdominal or pelvic tumor, unless perhaps the patient had previously borne children.

The inflammatory condition of the dermoid is interesting too, in addition to the complete adhesion of the mass to the abdominal contents. The size of the dermoid is worthy of especial notice.

CASE No. 3.—*Eclampsia without usual preeclamptic symptoms.* Mrs. J. C., age 34, primipara. Patient was under my constant observation from beginning of third month of pregnancy. Past history negative except for scarlet fever, at fourteen. Urinary examination was regularly made at two and one-half week intervals. The probable date of confinement was the last week in July of this year. On June 13 I went to her home to make the customary pelvic measurements. Except for an edema of the ankles there were no objective or subjective symptoms worthy of note. Her blood pressure was 118-80. There were no visual disturbances, no headache, epigastric pain or dizziness. The urinary specimen was examined this day and was absolutely normal. Two days later, on June 15, I was called to her home. Edema was not particularly increased but she had a slight headache. Her mental condition was peculiar for she acted silly. Amnesic aphasia was present and rather extreme. Blood pressure 120-80. In the evening I returned to her home taking a nurse with me to watch her and care for her. As I entered the house, I heard a commotion upstairs and the unmistakable respiratory sounds of an eclamptic fit. I found the patient in a severe eclamptic seizure. Administering a half grain of morphine, I called an ambulance and had her taken to my hospital where I immediately performed cesarean section. Her blood pressure just previous to section was 100 systolic and 70 diastolic and catheter specimen of urine showed a heavy trace of albumin. A healthy child was

delivered and the patient made an uneventful recovery. The urine was clear and normal in every respect on the third day and she voided large quantities. The antepartum convulsion was the only one she had. Her mental confusion quickly cleared. She was home on the eighteenth day.

The absence of visual symptoms, the absence of the omnipresent preeclamptic symptom of epigastric pain, the low blood pressure and normal urinary findings, followed by true eclampsia in less than forty hours is rather extraordinary.

I cannot account for the low blood pressure after the eclamptic onset and just previous to the cesarean unless maybe an old myocardial condition was present and the heart muscle overtaxed by the convulsive effort, would be a sufficient explanation.

192 STATE STREET.

AN OPERATION FOR RETRODISPLACEMENTS OF THE UTERUS*

By JOHN W. KEEFE, M.D., F.A.C.S., PROVIDENCE, R. I.

I HAD the privilege last spring of witnessing a number of operations performed by Italian surgeons, both at Naples and at Rome, and I was greatly impressed with the dexterity and other accomplishments and the excellent technic which they practiced.

An operation performed by Professor Pestalozzi of Rome appealed to me as something out of the ordinary, and I thought you might be interested to know more about the details of this procedure. I also would appreciate an expression of opinion as to the value of this operation for the relief of retroflexion.

We are all familiar with the causes of retroversion, retroflexion and descensus of the uterus, and we know that several conditions may act as causative factors; consequently, no single method of operating can be applied to all cases and to bring about a cure, several operations for repair may be necessary.

The technic of the operation for the correction of retroflexion is as follows:

The patient is placed in an exaggerated Trendelenburg position. A modified Pfannenstiel, slightly curved, transverse incision is made through the skin and fat down to the fascia covering the recti muscles. This incision with its convexity toward the pubes, extends from a point one inch to the inner side of the anterior superior spine of the ilium, to a like point on the opposite side, on a line with the upper border of the pubic hair. The resulting scar will come in the fold of the lower abdomen, just above the pubes, and on account of the location of the wound it is scarcely noticeable.

It has been said, that the Pfannenstiel incision has been advocated principally for cosmetic reasons, as though these could be a matter of indifference, or minor importance to the patient.

Should we not make special efforts to avoid the unsightly scars so frequently

seen, following the median incision, namely, the wide scar, the depressed areas, pigmentation, keloid, bulging from atrophy of muscular structures due to nerve injury; however, there are other advantages to the Pfannenstiel incision, the most important of which is the lessened tendency to postoperative hernia. Then, too, the convalescence is shortened, as the patient may leave the bed earlier and an abdominal binder is not required.

Continuing, the flaps are dissected upward and downward for a distance of about five inches. A second vertical incision is made near the median line, at right angles to the original incision, through fascia, rectus muscle and peritoneum. A careful examination is now made of the abdominal contents and any pathological condition found is corrected. When the uterus is replaced in the normal anteverted position the round ligaments are observed to be lax and of too great length to be of material assistance in holding the uterus in the new, yet normal position.

The salient features of this operation are that the bladder is first detached from the anterior surface of the uterus and then sutured to it in such a manner, that the upper portion is attached to the upper anterior surface and fundus of the uterus.

The steps of the operation may be summarized as follows:

1. A transverse incision is made through the peritoneum, one-half inch above the upper attachment of the bladder to the anterior wall of the uterus.

2. The peritoneum and bladder are now separated from the uterus as far as the junction of the cervix with the vagina, in a manner similar to that employed in separating the bladder from the uterus during operations for hysterectomy.

3. The bladder is then pulled upward and attached by four interrupted chromic gut sutures passed through the bladder musculature and the anterior wall of the uterus at points just below a line drawn between the uterine attachments of the round ligaments.

4. The flap of peritoneum which was reflected just before separating the bladder from the uterus is fixed by four interrupted catgut sutures to the fundus of the uterus, or to the posterior part of the fundus.

5. The abdominal wound is closed with a continuous suture of catgut in the peritoneum, a double chromic catgut suture in the fascia, plain catgut in the fat and interrupted dermol sutures in the skin.

The operation of freeing the bladder from the uterus and raising it, so that it pulls upward the anterior wall of the vagina, aids in the cure of retroflexion, vesicocele and slight prolapse of the uterus.

When I first considered this operation, I realized that the round ligaments were lax when the uterus was brought forward so I devised the following technic for shortening the round ligaments:

An incision two inches in length is made through the peritoneum covering the uterus and round ligaments, the center of which incision lies over the insertion of the round ligaments into the uterus. The edges of peritoneum along the incision are retracted and the uterine portion of the incision deepened sufficiently to receive the round ligament about to be embedded in it.

The round ligament, freed of its overlying peritoneal covering, is now grasped with forceps and drawn taut in the direction of the uterus, thus taking up the slack. The loop of round ligament resulting from this procedure is fixed in the slit in the wall of the uterus, by three or four chromic gut sutures. The peritoneum is then drawn over the ligament and united with a continuous, plain catgut suture. The opposite round ligament is treated in a similar manner.

CONCLUSIONS

Attaching the bladder to a higher position on the uterus has the effect of holding the uterus in a normal, anteverted position and of raising the anterior vaginal wall.

Shortening the round ligaments by the method here advocated has the advantage of retaining the original attachments of the round ligament, so that traction upon the fundus of the uterus is normally applied.

262 BLACKSTONE BOULEVARD.

Society Transactions

Dr. A. M. MENDENHALL, INDIANAPOLIS, IND., presented a paper on
Craniotomy. (For original article see page 372.)

DISCUSSION

DR. ADAM P. LEIGHTON, PORTLAND, MAINE.—I still adhere to the few re-
marks I have previously made relative to craniotomy. I do not wish to appear dis-
respectful, but there are cases, possibly, in hospital treatment, brought in to you
where craniotomy may be indicated. Unfortunately, I have no general hospital
clinic, and I can imagine possibly a case in the country which might be so bungled
that craniotomy might be the way out. The possibility of a dead baby may offer
an indication for craniotomy, but if that intrauterine death was due to my bungling
or carelessness, I should dislike to finish the picture! I do not see any particular
reason for allowing the woman to get into such a condition that craniotomy might
be indicated.

DR. WILLIAM PFEIFFER, BROOKLYN, NEW YORK.—Dr. Leighton has not a
hospital service where cases are handed to him, seriously compromised but those
who have such service are up against it. There can be no difference of opinion in
regard to the dead child. With regard to the living child, I beg to differ with
him except in the case of hydrocephalus. As an obstetrical proposition, it is not
sound judgment. I think there are other methods of delivery. In a recent Johns
Hopkins Bulletin, there is an article by Harris from Williams' Clinic, showing in
243 cesarean sections, 28.7 per cent hysterectomies performed with a very small
mortality and delivering in most instances a live child. E. P. Davis and Williams
do hysterectomies upon cases that have been examined once or twice considering
them infected cases.

As to the case of the operation, it is not so easy as the doctor sets forth. Af-
ter the child's head is perforated, the cephalotribe does not always hold, and oc-
casionally it will be necessary to apply it three or four times before a good grasp
can be obtained.

In a recent case of very badly bungled perforation, an attempt at forceps had
been made before the cephalotribe was applied, and version had also been attempted.
The child was in transverse presentation, with a high contraction ring, and the
woman almost pulseless. It was difficult to complete the perforation and to make
the extraction. The woman died in twelve hours. That is nothing against the
operation because it was a badly selected case. We cannot say which child will
survive and which will not in operating on them by abdominal route and I hesitate
to perforate the head of a living child.

DR. EDWARD SPEIDEL, Louisville, Kentucky.—The operation of craniotomy is performed so infrequently by most of us that unless conditions are very fair, it becomes a more dangerous operation than the three which we substitute for it—version, high forceps, or cesarean section. Consequently in anything more than a moderately contracted pelvis it becomes a serious thing to do a craniotomy. I do not know whether the essayist included transverse presentations in considering the subject or not. The majority of destructive operations that we have been compelled to perform in the City Hospital in Louisville have been in neglected transverse presentations where we have an impacted dead child, with an arm hanging out of the vagina and the waters drained away. In those cases I find it an easy thing to deliver by amputating the arm. I have never met a case that did not occur in a multipara. The arm can be pulled down to the vulva, the anterior vaginal wall protected by a retractor, and with scissors curved on the flat, the arm can be cut away from the shoulder; then it is easy to reach the leg and bring out the child. I have done this six or eight times and in no instance was there any difficulty with the aftercoming head.

DR. WILLIAM D. PORTER, Cincinnati, Ohio.—The essayist spoke against version, stating that it is contraindicated in those cases in which craniotomy was applicable. There is one condition, however, which he mentioned in which I think craniotomy and version will enable us to handle the case better than in any other way, and that is in hydrocephalus. In these cases it is easy to perforate the head, but the flaring cranial bones are difficult to deliver satisfactorily. They are easily handled if, after perforation, you do a version, and as the head comes into the pelvis the bones come together, the brain is extruded and the delivery is a simple process.

DR. ARTHUR H. BILL, Cleveland, Ohio.—I dislike to go over what I have already said in regard to perforation of the head. What I said did not concern the dead child but the living child. In cases in which Dr. Mendenhall says there are contraindications to the use of cesarean section of any variety, I do not feel that we are justified in destroying the child when we have a means of delivering it through the pelvic cavity by enlarging the bony girdle. To my mind sawing through the pubic bone, which is an operation entirely outside of the genital tract, outside of the vagina, the uterus and peritoneum, does not complicate the situation in regard to infection, or materially add to the danger. I cannot see any reason for saying that pubiotomy is contraindicated in cases that have been neglected, that is the so-called potentially infected cases when the child is still alive and in good condition. I laid emphasis on pubiotomy as an emergency procedure. Perforating the head of the living child to my mind is about the worst thing we can do in obstetric practice.

DR. MENDENHALL (closing.)—In reply to the remarks of Dr. Leighton, I would refer him to the fourth conclusion in my summary. You have no predecessors on your cases, you acknowledge. Those obstetricians who are doing clinical or charity work get cases under altogether different conditions from what you get your cases. I hope it will not be necessary to do craniotomy upon my private cases. I have yet to do a craniotomy on my own case. That is a different question from the cases that are sent in to us.

Some one mentioned transverse presentation. I did not say anything about that phase of the subject as it does not enter into the question. If it did, we would talk about brow, face, and so on. Any presentation can be taken care of by some other method, by Braxton-Hicks version, internal podalic version, or by cesarean section. There must be more indications than transverse presentation to warrant embryotomy or a mutilating operation.

Dr. Porter spoke of version. We find that even though the baby is dead, some practitioners resort to version to deliver that dead baby. That was the only thing I brought out in my paper regarding version, which to my mind is contraindicated. Ordinarily this dead baby represents a labor that has existed for some period of time, and after it is discovered it is dead, I believe no one is justified in doing either a cesarean section or a version. Nevertheless, there are a great many operators who do version on a dead baby with a prolapsed cord for example. That is absolutely contraindicated. That is the only thing I brought out in connection with version.

DR. W. S. BAINBRIDGE presented a report of a **Case of Double Salpingo-oophorectomy with Partial Autotransplantation, Followed by Twelve Years of Menstruation and Pregnancy.** (For report, see page 379.)

DISCUSSION

DR. STEPHEN E. TRACY, PHILADELPHIA. PA.—I would like to ask Dr. Bainbridge, how soon after the abortion the operation was performed? In patients in whom there has been an infection following an abortion, it has been our custom to avoid operation for several months. If the infection has not entirely died out, operation may light it up with serious results.

I would like to know also if the ovary was entirely separated from its former attachments? In other words, was the blood supply entirely cut off before the ovary was transplanted? We frequently suture an ovary to the cornu of the uterus when both tubes have been removed, but we try to preserve its blood supply.

Several years ago I assisted at an operation for acute gonorrheal infection of the pelvic organs. The surgeon intended to remove both appendages, but in ligating the right side a small piece of ovary was included in the ligature and allowed to remain. The pelvis was drained through the lower end of the incision. Two or three years later the surgeon was advised that the patient had married, had conceived promptly and had given birth to a healthy child.

DR. W. WAYNE BABCOCK, PHILADELPHIA, PA.—I wish to report two cases in this connection; one a young woman did not desire any future pregnancy. Both ovaries were resected freely and she was told that she would not become pregnant. However, she became pregnant the following year, and bore a living and healthy child.

The other case was a young woman who had extensive inflammatory disease in which we thought it was impossible to save anything except the uterus. The adhesions were exceedingly extensive, and we removed both tubes and ovaries as we thought, but two years later the patient became pregnant. How she became pregnant we do not know. Despite our care in trying to do a complete operation we had left in a piece of the ovary and did not know it. That seems to be a rather difficult thing to tell in some of these cases of ovarian transplantation. Maybe Dr. Bainbridge can tell us how he knew none of the ovarian tissue was left at the normal site or left in the adhesions in the region of the normal site.

DR. TRACY.—May I ask Dr. Bainbridge what material he used for his ligatures?

DR. JAMES N. WEST, NEW YORK CITY.—I would like to ask Dr. Bainbridge regarding the patient's labor, if he had attended the patient in labor, or if he has any history of the labor? The reason I ask this question is because it is an extraordinary case, and one should look at it from every point of view.

I was a witness in a unique case in which a woman was accused of the crime

which is technically known as "forcing a spurious heir." This woman went into a house where confinement cases are taken; went to bed, had a placenta, and a baby brought from the next room. A doctor looked at the placenta and baby, and gave a birth certificate. I had examined this woman two months before for menorrhagia. The uterus was not more than normal size; she had excessive periods. She was supposed to have had a full term healthy child, and it became quite a noted medicolegal case in that it was necessary to have a trial of such a kind that there would be opportunity for a doctor to testify without violating the law in regard to privileged testimony. It took the form of an action instituted by the Board of Health to change the name of the baby. In that way testimony could be given which in a regular trial could not. The case was tried before the Corporation Counsel of New York. The woman fled after my testimony and never was arrested, and the supposed father was released from legal responsibility as the heir was proved spurious. The woman's case broke down toward the end and she confessed she had done this very thing. Many cases have occurred where women have produced spurious heirs to palm off on their husbands. I would therefore like to know something about the labor in the case reported by Dr. Bainbridge.

DR. BAINBRIDGE (closing).—In answer to Dr. Tracy's question, the patient came under my care some weeks after her miscarriage. She was treated expectantly for some time prior to operation, rest in bed, topical applications, etc.

In reference to the question as to whether or not some ovarian tissue may have been left *in situ,* this was impossible. When the masses had been excised, there was nothing left but the uterus,—the tubes, ovaries and even most of the ligaments had been removed.

Regarding the ligature material, I used simple, fine catgut to attach the stroma *in situ,* with fine, black linen for the peritoneum.

Dr. Babcock spoke about the completeness of the operation. I think there is no question but that these masses on both sides left the uterus practically without very much support.

In response to Dr. West's question, there was no uncertainty as to the paternity of the child. The family physician who was the accoucheur in this instance, assured me there was no doubt.

Dr. W. W. BABCOCK, PHILADELPHIA, PA., presented a paper entitled **Transplantation of the Cervix.** (For original article see page 380.)

DISCUSSION

DR. WILLIAM M. BROWN, ROCHESTER, NEW YORK.—The doctor said the patient came back to this country after having been delivered in England. Did you have an opportunity to examine the cervix afterward, and if so, what was the condition after delivery? The thought occurs to me that the cervical canal was transplanted from the normal circular muscular fibers around it back through the muscle, where the muscular fibers would be almost transverse, and what effect did that have on delivery, and what was the condition of the cervix after delivery.

DR. STEPHEN E. TRACY, PHILADELPHIA, PA.—The procedure recommended by Dr. Babcock, is an excellent one in the type of case under discussion. Some years ago I operated upon a patient who had a badly traumatized cervix with much scar tissue. After the scar tissue had been dissected out, there was not sufficient tissue to cover the amputated cervix. In that case we separated the vaginal wall all around the uterus, split the posterior vaginal wall about 3 cm., and moved the

cervix back. The denuded area was then easily covered and the operation gave an excellent result.

DR. BABCOCK (closing).—Examination of this patient showed a transverse laceration of moderate degree, such as we find in the average patient who has borne a child. If I had known she had this transverse laceration, I might have done otherwise. I thought she had a normal cervix except that the cervix was not well invaginated. Of course, the mucous membrane overlying the cervix is so thin and so elastic that apparently it was not deformed in any great degree.

DR. JAMES N. WEST, NEW YORK, N. Y., presented a paper entitled **The Pernicious Effects of the Intrauterine Stem Pessary.** (For original article see page 383.)

DISCUSSION

DR. HERMAN E. HAYD, BUFFALO, NEW YORK.—Most physicians do not realize the danger of introducing a sound into the uterus. That is one of the reasons why Joseph Price spoke so strongly against all kinds of intrauterine tinkering in the shape of curettage and the introduction of sounds. Price taught, the curette and sound were seldom or never necessary, and therefore, always capable of doing much harm. However, I believe that is going too far, just as I think Dr. West goes too far in condemning the stem. I am satisfied the sound, when used carefully and judiciously, can be a useful instrument, and I am satisfied that curettage is often a very necessary operation.

So far as the stem pessary is concerned, there are many things that we may do but cannot teach too freely. I believe occasionally there are cases, if carefully studied, where the stem pessary is of great value. I have used the stem pessary quite frequently. I have seen a number of cases after a curettage and dilatation, say in three to six months, where the cervix recontracted and the dysmenorrhea returned, and then I dilated again and put in a stem pessary. The canal remained open, the dysmenorrhea was relieved, and I can report one case where after a number of years of sterility, she became pregnant and had a full term baby. Therefore, I would not like to take the position that the stem pessary is absolutely useless. I do believe occasionally it is of great value and should only be employed by men who will realize the dangers in its application and will remove it at once if it causes undue irritation.

DR. GRANDISON D. ROYSTON, ST. LOUIS, MISSOURI.—I should like to ask Dr. West to define a pathologic anteflexion that would require amputation of the cervix. Another question: Would he amputate the cervix for dysmenorrhea in a young, unmarried girl. We all see young unmarried girls in whom bimanual examination fails to reveal anything in the way of uterine displacement, anteflexion, or retrodisplacement, yet they have dysmenorrhea. Many of these cases are really occupational disorders. We find cervical stenosis if we are to believe the statement of Sellheim that the normal diameter of the cervix is four millimeters, and when the canal measures less than that some obstruction may be expected. In such cases a simple dilatation and curettage have not been uniformly successful in my hands. I have been using the intrauterine pessary in unmarried women, where there is no infection. The patient is warned not to take any douches, and we assume she will not be exposed to any sexual infection. The use of the Carstens' intrauterine pessary has been successful in relieving the majority of these patients of dysmenorrhea. In ten years I have not seen any infection follow its use. Only this month I de-

livered a case who had one of the spiral gold pessaries inserted in Chicago for producing sterility. She was three months pregnant when seen and the pessary was still *in situ*. She had paid forty dollars to prevent that pregnancy. Some years ago where I was working in a dispensary, an intrauterine pessary was inserted in a patient for the cure of sterility. This patient developed a streptococcus cellulitis and almost lost her life. Any pelvic infection contraindicates the use of the pessary. I think where such a pessary is used, the woman should be warned against intercourse; she should take no douches during this period, and she should always be under observation.

DR. JOHN OSBORN POLAK, BROOKLYN, NEW YORK.—During last year we have had six cases of general peritonitis brought into our services resulting from the use of the intrauterine stem. I will admit that when these cases were carefully investigated they show that the stem should not have been used. An important point is the absence of infection, but with the cervical glands built on such a histologic plan as they are, having the power to retain infection for a very long time, particularly if that infection is a streptococcic infection, and we know that a very large number of these infections are streptococcic, the stem pessary seems to light up the condition. A large number of cases of parametritis, result definitely from intrauterine treatment by sounds or stems, and at operation one finds about the ovaries and tubes, not endosalpingitis but perisalpingitic and periovaritic disturbances the result of intrauterine cervical treatment and the use of the cervical stem. There is no question that there is a certain class of malformed uteri in which the stem, in the absence of infection, will relieve the dysmenorrhea and develop the size of the uterus. That is admitted, but I am frank to say that we cannot tell exactly the class every time.

DR. EDWARD J. ILL, NEWARK, NEW JERSEY.—I think my friend Dr. West is rather severe on us chaps who are old and are using the stem pessary. I want to take exception to some of the statements that have been made. Extreme views are apt to be erroneous. Anybody who uses stem pessaries, as I have shown to the members of this Association, must have difficulty. These pessaries invite infection. The pessary that has been exhibited is not the sort of pessary one should use. Take a patient who has not had infection, often a simple dilatation may suffice. Our patients are very carefully prepared. They are just as well prepared for that as they are for a major operation. That is a *sine qua non*. The uterus is very carefully dilated to a No. 36 French, and curetted when necessary under constant irrigation. No weight ever touches the part. The glass stem is No. 34. This glass stem never reaches the fundus of the uterus; it is within a centimeter of the fundus of the uterus. It is held in place by iodoform gauze which is left for three days, then renewed, and in six days it is all removed. I can see harm from any intrauterine pessary which is left in for weeks and months. There is no question about that. Where the patient is kept in bed under careful observation anything serious rarely happens.

The last serious case I heard about was a young woman who was sterile. She had dysmenorrhea. I put in a pessary and she left the hospital in good shape. She returned in three weeks with the pessary; she developed an abscess for which she was operated on. When we examined the pus we took out it contained a multitude of cocci. If I had not examined her I would have failed in the operation. That sort of thing must be considered. If you leave a stem pessary in for weeks and months, and say that patient must not have intercourse, you invite other things.

DR. HUGO O. PANTZER, INDIANAPOLIS, INDIANA.—We are all familiar with the baneful effects of intrauterine stems, and their inordinate use has been well put forward in the paper. I would endorse all that has been said since in the dis-

cussion. I have used intrauterine stem pessaries in cases of this sort. Given a woman who has a uterus like this, (indicating on blackboard), with immature development at puberty, you have here an attenuated uterine musculature, and ofttimes the uterus is held in a malposition and exhibits undeveloped musculature. Under proper antiseptic precautions, in a case that is not already infected, you can put in the intrauterine stem for a short time.

DR. WM. S. BAINBRIDGE, NEW YORK CITY.—I would like to ask Dr. West if he does not think that in our attempt to rid ourselves of the stem pessary, we may not, in some cases, run a greater danger along another line? I have seen a number of cases, young women who have had amputation of the cervix, in which the sterility was not overcome, and others where pregnancy did take place, but with severe dystocia resulting from the amputation.

DR. JAMES K. QUIGLEY, ROCHESTER, NEW YORK.—About six months ago the most popular exponent of contraception was in Rochester and a special meeting was held for the enlightenment of physicians, and about twelve of us attended. This woman showed all contracept devices, and among them was a gold wire Y-shaped stem pessary. One physician in New York she said had approximately 200 cases under observation where he had introduced the stem pessary. A short time after that I had a patient, the mother of two children, who had been to New York and evidently became inoculated with some of these pernicious contraceptive ideas and had one of the pessaries introduced into the cervix. She came to me complaining of pain and hemorrhage. I put her on the table, examined her, and said, ''You have had a stem pessary introduced.'' She replied, ''Yes.'' I said to her, ''You paid for it,'' and she replied, ''Yes,'' and I said, ''Unless you have had it removed you have been 'sold' because you have no stem pessary.'' She said, ''I am sure I have it because I have considerable pain.'' I explored the cervix; the button at the bottom had bent upon itself. The stem is very pliable, and the button was within the cervix well up toward the internal os. She had no infection following its removal and not much pain.

I should like to protest against the amputation of the cervix in a childbearing woman, not alone on the ground of sterility but on account of dystocia afterward.

DR. BENJAMIN RUSH McCLELLAN, XENIA, OHIO.—Where there is a sharp uterine flexion with a short anterior vaginal wall I certainly would not think of using a stem pessary. The unhappy result in one such case is a lesson never to be forgotten. The best way to deal with such a case is first of all to lengthen the anterior vaginal wall by dissecting it loose from the cervix and reattaching it at a much higher level. This gives the cervix uteri a chance to drop into the posterior fornix and tends to straighten the uterine canal. The operation is comparatively simple and entails a minimum of risk. Even where this condition is associated with hypoplasia, which is so often the case, this simple operation should precede further treatment of the latter condition.

DR. ARTHUR T. JONES, PROVIDENCE, RHODE ISLAND.—I want to mention the case of a young woman who came to me with one of these ''gold brick'' wish bone stem pessaries in. She said she had been wearing this pessary for about two years, evidently with the idea of preventing conception. She was told that they had some gold pessaries, and for $75.00 a New York doctor would put in one of the ''solid gold ones.'' She had been wearing that gold one for more than a year; she was having constant bleeding. She was sent to me, I examined her, and found an intrauterine solid gold pessary in there, but through the central opening of the flange which fits about the cervix was a mass of spongy tissue. I removed the pessary, and sent her to the hospital and curetted her. She insisted upon leaving the

hospital on either the fourth or fifth day, and by the time I got my pathologic report back she had gotten from under my care and had gone to Europe. The report of the specimen was that it was "probably malignant." I felt myself that the case was malignant and in this case a malignant condition was probably set up by the prolonged use of this pessary.

The glass pessaries I have used to develop a small uterus and to give the woman a chance to become pregnant.

DR. ADAM P. LEIGHTON, PORTLAND, MAINE.—Since some remarks have been made about the introduction of stem pessaries for bringing about abortion, I cannot help taking this opportunity to mention the technic a certain Portland lady made use of in bringing about an abortion and the retention of this foreign body for a considerable length of time. I was called to see a woman who had a foul vaginal discharge and found she had never borne any children. I put my finger up in the fornix of the vagina and found seeming scar tissue in the left part of the cervix and in the vault of the vagina. I thought it was an old tear. I swept my finger up into the fornix and pulled forth an eight inch piece of insulated copper wire which had been inserted and left in the uterus and vagina for fourteen months. She had produced an abortion fourteen months before. This copper wire was deeply embedded in the cervix and wall of the vagina. Following its removal she made an uneventful recovery.

DR. ROLAND E. SKEEL, LOS ANGELES, CALIF.—Dr. Ill and Dr. West are discussing two different matters. Dr. Ill is discussing the retention of the stem pessary for a short time, under close observation, and after thorough preparation as for any surgical procedure; and he retains the stem in the uterus with iodoform gauze, which is quite different from inserting a stem and leaving it in the uterus for several months. For some time my immediate colleague was a firm advocate of the stem pessary, but in one year I had to remove the pelvic organs of at least two of the patients in whom the stem had been retained for a considerable period of time. It seems to me if the men who use the stem pessary could always get their patients back when damage resulted, they would exercise more care in its use or discontinue it altogether. A woman who leaves the hospital with a stem pessary, wears it three or four months, and then develops an inflammatory condition of the uterus frequently fails to return to the physician who inserted it, so that he is not aware of his bad results and persists in the same plan of treatment. It is this class of patients Dr. West is discussing and not the carefully guarded patient whom Dr. Ill mentions.

Next as to anteflexion, we may grant there are a great number of cases of anteflexion; in fact, I believe that most nulliparous women have anteflexion, but in my own mind I am unable to associate this anteflexion in a causative relation with dysmenorrhea.

Having overcome the anteflexion one cannot promise that the dysmenorrhea will not return and be as bad as before. It may relieve for from three months to a year, but unless pregnancy supervenes no permanent good will have been done. We do not curette patients with scanty, rather than profuse menstruation and the operation thus consists of nothing more nor less than a simple dilatation, which in turn is nothing more nor less than nerve stretching. The same relief from pain occurs when we stretch the sciatic nerve for protracted sciatica. Certainly we cannot predicate any obstruction, for we have all seen these patients when menstruating and observed the blood oozing from the cervix in a steady stream, quite different from the spurt which would occur if there were an obstruction which was overcome by the painful contractions of the uterus. Conversely, while we understand that the internal os is in some manner a barrier to ascending infection, it is hard to

imagine a cervix from which the blood trickles out offering any barrier to the ascent of a motile spermatozoid. Perhaps we can develop the uterus by the stem pessary used as Dr. Ill suggests and if this will cure the ordinary type of dysmenorrhea we should proclaim it from the house tops, as I do not know of any patients who come to the office of the gynecologist more often and leave with as little satisfaction, as young girls with dysmenorrhea.

DR. WEST (closing).—I have seen two young women die of septicemia, probably the result of the use of the stem pessary and have been called in consultation in several cases where the women have barely escaped death. The condition for which the stem is used is a minor one for which the patient is subjected to the danger of the use of a stem.

This whole subject brings to mind evolution. In the evolution of animal life we had one period known as the molluscan, where the mollusks were the chief group of animals on earth. That lasted for a certain time and was succeeded by the reptilian period which predominated. Finally it came to our time when mammals predominate. Our evolution in surgery should have brought us to the abolition of stem pessaries and those who continue to use them represent our reptilian or second period.

This pessary is from Gaillard Thomas. He made one of these pessaries. It is a ridiculous looking thing, and nobody would think of using it now. There are other stem pessaries in this collection which no one would advocate the use of, but they have most distinguished names. Dr. Peasley was one of the fathers of gynecology, and many of us use his instruments today, but we should not use the stem because Dr. Thomas and Dr. Peasley advocated stem pessaries in those days. This is a case where evolution is taking place, and I am trying to help evolution along a little by condemning the use of stems in the uterus for any considerable time on account of the damage they are liable to produce.

Doctors used to curette patients in the office without any preparation. Some good men did that. They do not do it now. All women did not die from this procedure. If they did, practitioners would never have done it a second time. A good many women survive the use of different kinds of stems. A large number survive with damaged parametria, like the beautiful young married woman whose case I have reported. Some of them die of septicemia, and why should we continue to use such stems? One of the chief advocates in modern gynecology admits that these stem pessaries are dangerous and should be carefully watched. Then what should be done where formerly a stem would have been used? This brings us to the subject of amputation of the cervix. I want to say a few words about that because I mentioned it in my paper as one of the methods of relief for dysmenorrhea and sterility.

I would like to answer all the questions in a short time and think what I am going to say will cover the ground without making individual answers.

Quite a large number of young women have anteflexion. When the anteflexion is considerable it becomes pathologic, and often these patients develop dysmenorrhea. These extreme forms of anteflexion are undoubtedly deformities; they are developmental troubles. The uterus as it develops in the young girl, when she is just coming to puberty, develops against a short posterior vaginal wall.

Here is a uterus, with a very complete flexure. You will always find a short posterior vaginal wall, and the anteflexion may be severe. If the uterus develops normally or develops nearly in a straight line, there is a good big space back of the cervix. What happens is this: the girl in her development does not develop the vagina properly, and as the uterus grows the cervix meets with obstruction and turns toward the point of least resistance which is the canal of the vagina; it turns upon itself and creates an acute flexion. I have amputated the cervix at the point where the acute anteflexion is, and the tissue at the point of flexure is

almost like scar tissue; it feels almost like cartilage; the musculature is almost gone or so atrophied that you can scarcely find it. We know that the cervix is well supplied with filaments of sympathetic nerves. These filaments when anteflexion has occurred are pressed upon in this part of the cervix just like they would be in scar tissue of the cervix after a laceration. The result is tissue which will not dilate when the uterus dilates with the congestion of the menses, just the same as any organ which has a tight capsule is subject to pressure when inflamed. These sympathetic nerve filaments are involved in the tissue which cannot dilate with dilatation of the rest of the uterus and while the pressure exists the patient suffers pain and cramps. Anteflexion is quite common but most of these young girls that come in for its treatment will be relieved if they become pregnant, and if a girl suffers very much we give her an analgesic to relieve pain for a few hours during the worst of the dysmenorrhea.

Then comes the more severe type of dysmenorrhea where the anteflexion is acute, and the patients suffer extremely. Sometimes such a patient will be hysterical. I have seen cases where they would actually become insane for a short time. Cases of this kind have led me to study the causes of pain in dysmenorrhea of anteflexion. Such is the following case of acute anteflexion. Dilatation will relieve about 40 per cent of these cases, but 60 per cent of them in two or three months will be as bad as ever. Forty per cent will be relieved sufficiently not to require further procedure. This little French girl whose mother was a widow, and for whom the necessity of earning her own living was absolute, suffered extremely from dysmenorrhea. She lost one position after another as a result of the disability. I had dilated the cervix well, and she was much better for two months, then the trouble returned with all its force. I was requested to remove the ovaries and tubes. They thought she would have to go to an insane asylum, and I was urged to do anything I could for her relief. I amputated the cervix quite high, and the result was remarkable. She has not had any more dysmenorrhea; she has been cured absolutely. A short time afterward she got married and had one abortion after another. Finally she became pregnant, and on account of pernicious vomiting of pregnancy, I put her in the hospital. She finally carried a fetus to seven months because she was kept in bed and treated carefully for pernicious vomiting of pregnancy. The baby died. I got rid of the dysmenorrhea without removing the ovaries, as she and her mother wanted me to do.

This was my pioneer case of amputation of the cervix for dysmenorrhea and I had amputated so high as to interfere with the function of reproduction. In later cases I leave about one-third of an inch of the cervix below the internal os, which gives excellent results.

DR. G. VAN AMBER BROWN, Detroit, Mich., presented a paper entitled **Kidney Structural Changes in Early Years.** (For original article see page 358.)

DR. H. D. FURNISS, New York, N. Y., presented a paper entitled **Diagnosis and Treatment of Tuberculosis of the Kidney.** (For original article see page 386.)

D<small>R.</small> R. T. M<small>ORRIS</small>, New York, N. Y., presented a paper entitled **Bladder Surgery in Relation to the Fourth Era of Surgery.** (For original article see page 392.)

DISCUSSION ON THE PAPERS OF DRS. BROWN, FURNISS AND MORRIS.

DR. JOHN OSBORN POLAK, B<small>ROOKLYN</small>, N<small>EW</small> Y<small>ORK</small>.—I know of nothing that is more illuminating than to be told that of the 80 babies the doctor dissected, 63 per cent of them, if they had lived, would have started life with impaired renal function.

DR. ROBERT T. MORRIS, N<small>EW</small> Y<small>ORK</small> C<small>ITY</small>.—In reference to the paper of Dr. Furniss concerning tuberculosis of the kidney, I wanted to try the Bier hyperemia principle in tuberculosis of the kidney. With the idea of ligating the renal vein later, I injected the kidneys of a series of rabbits with tubercle bacilli. At the end of two or three weeks the rabbits were showing the effect. I opened two rabbits and found tuberculosis was well under way, but I was not quite ready to tie the renal vein to carry out the experiment. When I returned after a prolonged period the attendant at the laboratory said the rabbits were all getting hungry and making love in a perfectly natural way. I opened the rabbits that were getting over the tuberculosis by themselves in order to watch the condition. I closed up all but two. In examining them at the end of three months I found there was not one that was not perfectly well. The fact that tuberculosis had progressed up to the point of making the rabbits very ill, and then the rabbits overcame the effect and got well without any treatment is an extremely important point to remember.

DR. JAMES N. WEST, N<small>EW</small> Y<small>ORK</small> C<small>ITY</small>.—Apropos of this subject, I would like to say that about four years ago I had a patient in whose case a diagnosis was made of tuberculous kidney and bladder. The patient suffered a great deal with frequency of micturition; she had lost considerable weight. A good many men have written articles on the early diagnosis of tuberculosis of the kidney and the necessity for it without giving anything further of what they should do when they made an early diagnosis. I placed this patient under such treatment as one would for pulmonary tuberculosis. I carefully instructed her about her health, her diet, and exposure to the sunshine and the fresh air. She was a very faithful patient and carried out my instructions very literally. In a little over a year this woman gained twenty pounds in weight; she looked fairly well but suffered a great deal with her bladder, and she still had from time to time a good deal of pain. She did not sleep well, and looked rather cachectic in spite of an outdoor life, although she had gained in weight. I determined to remove the kidney and a part of the ureter, which was much diseased. I found this kidney was but little more than a shell; it was not functioning; it was purulent and after removal that woman has made a recovery. At present her bladder does not disturb her very much. Her health is much better in every way.

DR. G. VAN AMBER BROWN, D<small>ETROIT</small>, M<small>ICHIGAN</small>.—Dr. Furniss made a comparison between the value of laboratory methods and the use of guinea pigs in making a diagnosis of renal conditions. I agree with his statements in this connection. In the literature within the last year I was impressed with the report of four kidneys removed on a diagnosis of tuberculosis, which upon microscopic examination failed to show tubercle bacilli. In these cases the diagnosis had been based on inoculation of guinea pigs. The animals may have been tuberculous at the time of inoculation. In two cases nonmalignant tumors of the kidney caused the symptoms, and in two others the kidney was normal but there was a slight apical tuberculous process.

DR. FRANCIS REDER, St. Louis, Missouri.—I wish to refer to sinus formation after the kidney has been removed and the healing process about completed. The operation of nephrectomy for a tuberculous condition is one of the most grateful operations. Bladder symptoms, which are frequently secondary, usually disappear after the kidney has been removed. But there is sometimes a distressing feature as a sequel to a nephrectomy for a tuberculous lesion, namely sinus formation. It does not seem to matter much how the stump of the ureter is treated, whether it be treated with a cautery, or whether it be treated with a carbolic acid application, a sinus quite often follows. When Dr. Furniss says the sinus will heal in two or three months, or in a year and a half, it is encouraging for those who meet with this condition. I have several cases on hand at present, one dating back three years. One of these cases was very much dissatisfied and went to the Rochester Clinic two years ago, where an extensive operation was performed. For several months matters looked encouraging, then the sinus again appeared and is active at present.

The best results obtained in the treatment of this condition have been with the injection of bismuth paste (Beck) somewhat stronger, however, than the original formula. With this paste I can usually keep the sinus closed from four to eight months.

DR. JAMES E. DAVIS, Detroit, Michigan.—All who have looked over the literature upon the pathology of the kidney will be at once convinced that there is much to be settled. The classification of kidney findings is in many ways unsatisfactory. I think it is of very great importance to have a research study upon this subject recorded before this Association.

The amount of work Dr. Brown has done I think needs special commendation. The material that he has worked upon is excellent, and it offers much in the way of promise that will go far toward settling or helping to settle some of the problems we now have in an unsettled condition.

This kind of material is always abundant. We can always have plenty of bodies of young children to study. It is rather tedious to sit down and make a careful study of the morphology. It is likewise more tedious to make a careful microscopic study of kidney tissue from young subjects. The preservation of this material is exceedingly important. Unless made at least within two hours after death, it will not give reliable material for a careful study. The kidney should be preserved at once; it should be sectioned so that the preservative fluid will reach all parts of the tissue, and the most searching study should be made of different parts of the kidney.

A very important phase of the subject that Dr. Brown has mentioned comes in connection with the infections of early childhood. During the first decade of life most of the infections are encountered, and it is my firm belief that we have a beginning permanent pathology of the kidney laid down during this period. It is true, the changes are so minute that frequently we are unable to be quite sure of their presence, but I am sure that when our studies are carefully done, and we look into the condition of the terminal arteries, and are able to recognize the changes that go on there after or during every infection, and consider the aggregate of infections that come during the first decade, we will then understand how later on we are going to have some of the surprises that are clinically spoken of as "clouds in a clear sky." No one suspects kidney pathology in this or that case, but the reason for the condition was an injury sustained in the first decade of life.

DR. STEPHEN E. TRACY, Philadelphia, Pennsylvania.—We should ever be on the alert to recognize renal lesions. Undoubtedly there are many unnecessary operations done on the abdominopelvic organs when the pathology is in the renal system. Many patients with a calculus in the ureter have been operated upon for

chronic appendicitis. Some years ago a patient who suffered with abdominopelvic symptoms, consulted a gynecologist who repaired some lacerations; the symptoms continued. She then consulted a surgeon who removed the appendix; the symptoms were in no way modified. She later consulted another surgeon who removed the gall bladder; the same symptoms continued. The patient had a tuberculosis of the left kidney, ureter and bladder. The kidney and entire ureter were removed. After the operation the capacity of the bladder increased from 30 to 600 c.c., and she remained in good health for four years when she developed a large ovarian cyst which was removed. She is now in excellent health twelve years after the nephro-ureteroectomy.

Recently we had a similar case. The appendix was removed by a general surgeon. The symptoms continued. Three months later the abdomen was opened by another surgeon for the separation of adhesions which were not present. She was in no way benefited by the operation. She had a tuberculosis of the right kidney and upper portion of the uterus. The ureter was strictured at the bladder. The kidney and the involved part of the ureter were removed and she had a rather rapid convalescence.

The discovery of tubercle bacilli in the urine without other symptoms of a renal lesion is not sufficient evidence on which to base a diagnosis of tuberculosis of the kidney. When operating for a tuberculosis of the kidney and the ureter is involved, if the condition of the patient will permit, the entire ureter should be removed. By so doing the convalescence will be shorter and if a sinus develops, it will heal more quickly.

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—I want to again refer to the edematous twin baby mentioned in my report. This case stimulated me to institute an inquiry in regard to the circulation of the blood of the mother in relation with the circulation of the blood of the fetus, that is, do they intermingle and how intimately do they come in contact? Also how much influence does the kidney efficiency of the mother have upon the baby? Through the courtesy of Dr. George J. Reberdy, of Detroit, I am privileged to cite this case. The patient was first seen April 5, 1922, and delivered the following day, April 6. Menstruation normal, never ill except in childhood. She weighed 150 pounds; had a blood pressure of 122 over 80, and was apparently in good health. Colostrum was present; the position was L. O. A.; fetal heart 140, clear. The measurements of the pelvis and vagina were ample. The woman was twenty-eight years of age, an American, with no occupation. Time of labor 18 hours, spontaneous delivery. The patient has used morphine habitually for eight years. On the day of confinement she had taken sixteen grains, by hypodermic injection, her daily consumption of this drug. Naturally there was much speculation as to the kind of baby she would produce. The child cried lustily, weighed five pounds twelve ounces; was normal in development, but after placing the child to the breast it became stupid and gave evidence of morphine poisoning The baby gradually failed and after some days died. Evidently absorption of the morphine had taken place in that child from the milk of the mother.

At Providence Hospital phenolsulphonephthalein and indigo carmine were injected intravenously into a number of women, at three hours, two hours, one hour, and a few minutes before delivery of their babies. The babies were watched for twenty-four hours afterward during which time every bit of urine was collected, and in no instance was there any evidence of the phenolsulphonephthalein or the indigo carmine passing from the mother into the urine of the child. Yet we have the evidence, as shown in the edematous twin, of the kidneys of a fetus at six months being very active indeed, followed by death of the fetus from suspension of its kidney function produced by back pressure caused by the imperforate urethra. This linked with the phenolsulphonephthalein and indigo carmine tests is strong evidence indicating the lack of intermingling of the blood stream of the mother and

fetus. It further raises the question—are any substances borne from mother to child by the blood stream and if so what? Luetic fetal kidneys do not show medial and adventitial blood vessel proliferative changes that adult kidneys show but the infection manifests itself by proliferation of the interstitial connective tissue. Is this due to the lack of specialization of the connective tissue or is it due to the failure of spirochetal dissemination by way of the circulatory system of the kidney?

DR. FURNISS (closing).—In Dr. Brown's collection there are a large number of malformations, representing a considerable percentage compatible with good health especially duplications of the ureter and of horseshoe kidneys. These will not become apparent unless some disease of the urinary organs occurs which would make investigation necessary. Evidently there is a greater percentage of duplication of the upper end of the ureter than of complete duplications from the kidney to the bladder. These are difficult to discover except by pyelography, or where the surgeon has catheterized the ureter a number of times and gets pus at one time and clear urine at another. I have seen 26 cases of complete duplication of the ureter. In two cases the ureters opened extravesically. One I anastomosed into the bladder from the vagina. In the second case a supernumerary ureter drained a portion of the kidney, not bigger than a small hickory nut. I resected that portion of the kidney with little difficulty and a most satisfactory result.

Dr. A. P. Leighton, Portland, Me., presented a paper entitled **Obstetrico-Gynecological Diagnosis.** (For original article see page 415.)

DISCUSSION

DR. EDMUND D. CLARK, Indianapolis, Indiana.—I should like to ask Dr. Leighton whether he used the x-ray in making a diagnosis in the second case?

DR. BURNLEY LANKFORD, Norfolk, Virginia.—Did you make a rectal examination to determine the position of the cervix in the second case?

DR. DAVID W. TOVEY, New York City.—Dr. Leighton mentioned the history of normal menses in his case as ruling out ectopic pregnancy. Ectopic pregnancy is easy to diagnose if you have a history of skipped menstruation and the cardinal signs of fainting, etc., but we frequently get a history of normal and regular menstruation in ectopic pregnancy. There is nothing more difficult to diagnose than ectopic gestation in a case where the symptoms are not regular. I do not think the cervix is of any particular use in diagnosing pregnancy. If the uterus is pregnant, you always get a soft elastic area just above the internal os. It is easy to feel by steadying the fundus of the uterus and inserting the fingers in front of the cervix. You must be sure to wait between the contractions, otherwise you get a hard uterus, because during pregnancy the uterus contracts rhythmically. If you put your finger in the vagina you stimulate the uterus to contract, and sometimes you will get a prolonged contraction, and you will get a hard area, but if you wait a few minutes for the contractions to stop, you will get a soft elastic area there. If the fetus is dead the area is so soft, that it is like putting your fingers into putty.

DR. WILLIAM M. BROWN, Rochester, New York.—I should like to ask Dr. Leighton whether he made use of blood chemistry in the third case, and further to get an expression of opinion from some of the members as to the value of blood chemistry in these cases of eclampsia, preeclamptic toxemia, or hyperemesis. The further I go in making observations of this complication of pregnancy the more uncertain I am and the more unable I am to make a prognosis or a diagnosis as to the degree of protein overload in the blood. I have found so many times cases of

impending eclampsia coming on without much evidence of increased toxemia, as shown by the blood chemistry, and yet after they have gone through seizures, or after they began to get well the nitrogen retention increases. Our pathologist has come to the conclusion that the blood chemistry lags. Apparently the clinical picture is twenty-four hours ahead of the blood chemistry. The principal picture we have to depend upon is the clinical picture. I have seen a case of eclampsia come on, in labor, that under the most painstaking care and observation did not show the slightest evidence of toxemia.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—I would like to ask the essayist whether he investigated the diet of the patient twenty-four hours preceding the attack of eclampsia. We have many cases in which the final cause seems to be a fat anaphylaxis, as we have cases of eating too much ice cream or of cabbage or greens impregnated with bacon grease as a fulminating cause.

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—With reference to the question of diagnosis of pregnancy in the unmarried, I think those of us who have done a good deal of consultation work have had to decide this question sometimes under very embarrassing circumstances. It seems to me, that before we should pass judgement in such a case as the doctor had, it would be well worth while to give the patient an anesthetic and make an examination that would be enlightening.

DR. LEIGHTON (closing).—As regards the question asked by Dr. Brown (Rochester) about the blood chemistry, I admit that I did no more than to examine the urine.

With regard to the question asked about the use of the x-ray, I did not use it. I have used the x-ray in one case, I remember, as an aid to diagnosis, and it worked out well. In this woman a diagnosis of ovarian tumor had been made and preparations to have it removed. To me her case seemed to be clearly one of pregnancy. The x-ray picture showed a seventh or eighth month pregnancy. The vertebrae could be seen. The x-ray in my experience is of little value until the case is within two months of full term, because you cannot obtain a good picture of the fetal bones before that time. I made no rectal examination in the tumor case.

As to the question of ectopic pregnancy in the first case, I knew some of you would mention this possibility. I possibly was too charitable or too gallant to speak of this case as one of ectopic pregnancy, because the patient was a very charming young lady.

I cannot agree with the statement that the cervix is not a good diagnostic sign in pregnancy. When I ruptured the girl's hymen and found a conical, elongated, hard cervix, I knew it was not one of pregnancy. The cervix is a valuable diagnostic sign in pregnancy.

The question of diet is important. Dr. Hastings-Tweedy, of Dublin, in his article, "The Cause and Cure of Eclampsia," says that food is the actual exciting etiologic factor in eclampsia. I have seen it proved myself. So far as diet in this case was concerned, I do not remember anything to which we could attribute the onset.

DR. JOHN W. KEEFE. Providence, R. J., presented a paper entitled **An Operation for Retrodisplacements of the Uterus**. (For original article see page 418.)

DISCUSSION

DR. JOHN OSBORN POLAK, BROOKLYN, NEW YORK.—I saw this operation performed by Rossini a number of years ago, and it has a field in covering myomectomy wounds; but I should like to call attention to one point, namely, carrying the

bladder up high does not keep the uterus forward, as has been shown by the experience we have had with the operation known as the Krönig cesarean section, where the bladder attachment is carried away up on the face of the uterus. I have seen any number of cases come back with their uteri retroverted.

I believe the cure of the retroversion is accomplished by his procedure in shortening the round ligaments, and, of course, there is an advantage in preventing peritoneal adhesions by carrying the normal bladder peritoneum over the face of the uterus. There are times when this procedure should be utilized just as I have suggested, for covering myomectomy wounds, bruises in front of the uterus, but as a cure for retroversion, unless supplemented by shortening of the round and uterosacral ligaments, it will fail because it is wrong in principle.

DR. HERMAN E. HAYD, Buffalo, New York.—Dr. Keefe has brought to us an operation that is very interesting, but after all the different operations we have performed for retroversion, and after the successes all of us have had with these operations and the failures which we have been able to attribute to them, I am surprised that he should try to establish this procedure which, first of all, slits the peritoneal covering of the uterus then tears it back and then doubles over the ligament and inserts it into the slot thus formed. No matter how carefully it is sewed over, it leaves a rough spot for future adhesions. He also separates the bladder from the front wall of the uterus which may make a number of permanent striae and folds, and be responsible for a great deal of future irritability of the bladder. I have advocated and employed for many years, plication of the round ligaments and then shorten them just as this Italian surgeon does. Then I sew the uterine end of the ligament into the cornu of the uterus to get a very strong attachment; of course, always being careful not to kink the tube and not to include too much of the ligaments in the bite of the ligature. Then a catgut suture, which will last only a few days is passed through the uterus to hold it up. If the uterus is heavy, it relieves the tension on the plicated area and when there is much sagging of the broad ligament, I insert a few stitches through the uterosacrals. We thus accomplish all that is necessary in the way of extending and elongating the anterior wall of the vagina and we will have occasioned the least amount of traumatism which is productive of so much future suffering from the subsequent intraperitoneal adhesions. A prolapsed ovary should likewise be lifted into place with a suture of fine catgut.

DR. JAMES N. WEST, New York City.—I have recently operated on a patient on whom this operation was done about eighteen months ago. I judge the peritoneum of the bladder was fixed to the fundus of the uterus. She came to the dispensary on account of frequent micturition. We found that the uterus apparently was drawn down by this attachment of the bladder until there was a marked procidentia. The uterus was small and the effect on the retroversion was not appreciable. I tried to do an interposition operation, but found that the bladder fold of peritoneum was too firmly attached to the top of the uterus.

DR. MAGNUS A. TATE, Cincinnati, Ohio.—In this operation described by Dr. Keefe, I would like to know what becomes of the bladder if the woman should become pregnant?

DR. JAMES F. BALDWIN, Columbus, Ohio.—I have for a good many years used a modification of the Pfannenstiel incision, in cases in which the patient is very anxious to avoid a scar. The modification consists in cutting down to the aponeurosis, dissecting up the flap, and then making the usual median incision. The flap is then brought down and attached to the aponeurosis by under-sewing back and forth with plain catgut, then closing the first incision with two or three

silkworm-gut stitches above the pubes, and the rest with catgut, taking in just the skin. The results, so far as avoiding scar is concerned, have been exceedingly satisfactory.

A number of years ago I advocated elevating the uterovesical fold when operating for the relief of long-standing retroversion. In these long-standing cases the bladder and uterus have pulled from each other so that the bladder is attached down on the vagina and not at all to the uterus. In such cases I cut across the peritoneum, very much as advised by the essayist, dissect the bladder from the vagina with the fold of peritoneum, then reattach the peritonium as high up on the anterior surface of the uterus as it seems wise. No stitches are put into the bladder but it is brought up into approximation and takes care of itself. The chief argument which I advanced in favor of this operation was that it eliminated the deep pocket from in front of the uterus. The intestines thus would not tend to push the uterus back. The round ligaments are shortened of course as necessary.

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—I wish to call attention to the fact that while the object is accomplished in a new way, the principle is old. It is the same as that employed by Dührssen and Winter in connection with vaginal fixation in 1892 of bringing the uterus forward. It is the vagina that holds it forward, and not the bladder. The vagina is a stronger and more fixed organ, and if the uterus is held forward, it is done by the vagina and not by the bladder, and not by the peritoneum which will not hold anything.

This operation and all operations that shorten the round ligaments intraperitoneally have the disadvantage brought out by Dr. West, namely, they pull the uterus downward and forward instead of upward and forward where we want it. The only operation that pulls it upward and forward is the Gilliam operation or some modification of it.

DR. DAVID W. TOVEY, NEW YORK CITY.—I do not see the advantage of the modification of the Pfannenstiel incision that is referred to by Dr. Keefe. One of the principal advantages that Pfannenstiel claimed for his incision is to prevent hernia. If you cut through the fascia vertically under the skin, you have nothing but the skin to hold the intestines back and I do not see why we should not produce a hernia with this incision the same as with a vertical incision. Stanton, of Schenectady, collected the statistics of a number of large hospitals of the country and found from 2 to 10 per cent of hernias following the vertical incision in clean cases. Pfannenstiel up to the time of his death had published 5,000 cases in which his incision was used without a hernia. I know of only one case operated on by the Pfannenstiel incision in fourteen years that was followed by hernia, and that was a case of carcinoma where a large abdominal drain was left in and hernia followed. If you make the incision and dissect up a flap and do not cut all branches of the twelfth nerve that go to the fascia and supply it, you will not produce a hernia. In separating the fascia from the rectus you get rid of the rigidity in the recti and can draw the recti to the spines of the ilium so that you have taken all tension out of it.

It has been pointed out that one of the disadvantages of the Pfannenstiel incision is that it presents difficulties if infection sets in. Such is not the case. I find the incision heals more kindly than a vertical incision, because the fibers of the skin and fascia run transversely and tension causes the wound to close. If the patient during the operation should strain or vomit, you will see the incision come together.

DR. ROBERT T. MORRIS, NEW YORK CITY.—A great many abdominal operations may be done in fifteen minutes through the short incision. You cannot do that with a Pfannenstiel incision. In the second place, if you have a patient who

does not relax, whose abdomen is rigid as sometimes occurs, it is difficult to make a very good repair if the Pfannenstiel incision is employed. In the third place, every operator gets primary union, but the other fellow does not. I have had to repair two cases in which infection occurred after a Pfannenstiel operation. Both of these patients have been reported as cured by the original operator, but they are not yet cured.

DR. RUFUS B. HALL, Cincinnati, Ohio.—I cannot see the logic of why we should repair the round ligament and leave stitches when it is feasible to shorten the round ligament by modification of the Gilliam operation, and bring the external part of the ligament through the inguinal canal; that does all that can be done, and leaves the patient's abdomen intact, so far as the round ligaments are concerned.

DR. KEEFE (closing).—Professor Pestalozzi told me he had performed this operation more than one hundred times with success.

It is natural for men who have not done an operation to condemn it theoretically, whereas the other fellow who has done a hundred of these operations may see the value of it. I was impressed with the skill with which this man operated, and I feel this way about it myself: that in women in the childbearing period it may not be well to put the bladder on top of the uterus. In women beyond that period I think it might be so utilized.

It is said that the vagina holds the bladder up; others say it is the floor of the pelvis that holds the uterus up.

I showed a picture in the beginning of my paper of a normal uterus lying right on the fundus of the bladder. If we insert two or three stitches, uniting the bladder to the uterus, then when the bladder is filled the uterus is raised; but normally it is resting on the bladder. I have not heard anyone put forth any convincing argument that this procedure is not of value.

I was very much impressed, and am yet, with the Alexander operation. A great many men say, you must open the abdomen; you may find something the matter with the tubes or ovaries. I believe that a specialist in gynecology ought to be able to determine whether there is any serious trouble with the tubes or not. If he cannot make it out, he had better not do abdominal section. There is a large field for an operation like the Alexander operation. It has been my privilege to have listened to some eminent gynecologists of earlier days when the operation of shortening the round ligaments by the Alexander operation was first developed. Professor Polk was one of the men who advocated it. Professors Munde, Lusk, Emmet, and others advanced arguments to the effect that the round ligaments had nothing to do with it. Emmet would not say that they had a lifting up property. Whenever you use the Gilliam operation and hold the uterus up to the abdominal wall, it is not a natural position at all. The nearer we come to what nature has done, the nearer we will come to something that is worth while. When we shorten the round ligaments in the way I have suggested, so that we are nearer the attachment of the round ligament to the uterus, that is the place to have it. Nature does not push it up to the anterior abdominal wall. It is said that subsequently the patient will have a lot of bladder symptoms. I have only operated twice by this method, and these patients have not had bladder symptoms. We do, this same thing when we perform a hysterectomy, separate the bladder from the uterus, do a supravaginal amputation, and stitch the bladder to the peritoneum on the posterior wall and the stump of the cervix. How many patients have bladder symptoms after doing that?

I am glad the operation I have described has brought out such a free discussion. I desired to obtain the ideas of some of you whether the opera-

tion is of value. I wrote Professor Pestalozzi as to whether he had published the results of this operation. I wrote him six weeks ago, but have not received a reply. I shall follow the operations up and see whether we can find any detailed report of his cases and what the subsequent results are after operation.

Concerning the two cases I have described, I still feel that I shall continue to do more of these operations and follow the cases up and see whether they develop bladder difficulties or not. When I saw this operation performed it struck me as something worth while, and I thought I would present it to you.

NEW YORK ACADEMY OF MEDICINE

SECTION ON OBSTETRICS AND GYNECOLOGY

STATED MEETING, HELD NOVEMBER 28, 1922

DR. WILLIAM P. HEALY IN THE CHAIR

DR. LE ROY BROUN reported a case of **Ovarian Papilloma with Secondary Involvement of the Abdominal Wall 18 Years after Subtotal Hysterectomy for Fibroid with Retention of Adnexa.**

The patient, a married woman, without children, first came under my care in 1904. She was at that time thirty-four years of age. She presented a bleeding fibromyoma reaching to the umbilicus. A subtotal hysterectomy was done, with retention of both ovaries and tubes. The recovery was smooth and athermic.

The patient was not seen again until August of this year, 18 years after the original operation. Up to one year prior to her visit she had been in excellent health. She first noticed a painless lump in the abdominal wall, to the left of the section scar. During the last five months the patient had had occasional nausea and symptoms of indigestion, and the lump above referred to has increased in size. She was well nourished, with firm thick abdominal wall and no evidence of free fluid. The laparotomy scar of the former operation was firm. To the left of the scar was a firm, hard painless tumor three inches in diameter; and apparently developed in the abdominal wall.

Vaginal examination showed an atrophied cervical stump. In the right lateral fornix was a small ovarian cyst the size of a large orange; partly fixed. The left fornix was free. There was no pain elicited. The patient insisted on delay on account of the anticipated marriage of an adopted daughter.

Three months later she again came to the office having developed alarming symptoms. The nausea had increased to the point of inability to retain food. The abdomen had become much distended and mildly sensitive, and the abdominal wall tumor had changed in contour, had lost its hardness and was tender.

The patient entered the hospital after a week's study and preparation, and the abdomen was opened on the diagnosis of malignancy. The free abdominal fluid of over three gallons was emptied. The abdominal wall tumor to the left of the incision was seen to be papillomatous in character involving the parietal peritoneum, the overlying layers and the rectus muscle. A part of the tumor was removed for examination. Immediately underlying this tumor and densely adherent to it were loops of intestines. The ovarian cyst partly filled the true pelvis, and projecting from the cyst wall to the lateral wall of the pelvis were papillomatous masses. No extended examination of the remaining contents of the abdomen was

made on account of the poor condition of the patient. There were, however, no other marked secondary papillomatous deposits.

The papillomatous abdominal wall tumor was evidently a secondary implant from the papillomatous cyst in the pelvis, this implant taking place in the site of the adherent intestines, the location of the greatest irritation.

A week later the patient was given deep x-ray exposures, and has received up to the present, two series of five treatments each. The effect of this treatment has been to decrease the size of the abdominal wall tumor fully two-thirds. The treatment has not decreased the rate of reaccumulation of ascitic fluid.

The fact that the hopeless condition of this patient is unquestionably due to the presence of the conserved ovaries with retrograde changes to a papillomatous malignant growth, brings up the question of the wisdom of at all times conserving adnexa, when apparently healthy, after the removal of the uterus. In this individual patient unquestionably they should have been conserved, since at the time of the original operation she was only thirty-four years old. The trend of the present-day custom is, however, to urge ovarian conservation at all times, whether the patient is near the menopause or past this period, except in cases of malignant disease of the uterus or adnexa. We are influenced to a marked degree by the customs and thoughts of our immediate day. Whether, however, we conserve the ultimate interests of our patients when we preserve the adnexa, about the age of the menopause, at the time of the removal of the uterus is still a doubtful question with me.

Less than ten years ago in the course of a discussion the question was brought up at a meeting of the American Gynecological Society, as to the advisability of removing the adnexa when doing a hysterectomy on a patient about the menopause age. Such opinions were the result of the experience of the operators, in spite of the fact that internal ovarian secretions were just as active at the time of that discussion as they are today, yet we had not had it so constantly put before our mind as it is at present. Four years ago Polak, before the same society, presented a paper on the study of the ultimate behavior of conserved ovaries as taken from a collection of cases from his own clinic. He voiced in this paper in every particular my own convictions that in instances of removal of the uterus the conservation of the ovaries should not be a routine measure, but that each case should be dealt with individually. I venture to predict that in the near future the surgeon will return to his original line of thought and question the endocrine value of conserved ovaries, when at the time of the menopause it is necessary to remove the uterus, the basis being that the patient's interests are better considered when she is certainly left free of a possible pelvic discomfort with the attendant nervous condition if the adnexa are removed at the time of the hysterectomy.

Dr. Broun also reported a case of **Carcinoma of the Cervix Uteri 12 Years after Subtotal Hysterectomy for Double Adnexal Disease in a Nullipara.**

This patient first came under my care in December, 1909, with a history of recurring pain and pelvic distress of nine years' standing. At that time she was forty-eight years of age and had never become pregnant though married for eighteen years. She gave a history of infection extending over eighteen years. There was a large, boggy uterus, and in both lateral fornices thickened tubes and ovaries could be felt imbedded in adhesions. A subtotal hysterectomy was done with removal of both adnexa. Gauze drainage was used through the split cervix and

culdesac, the peritoneum being closed above. The recovery was uneventful. The appendix was also removed.

The patient came again under my care in June, 1921, stating that she had been in excellent health up to a short time previously. She states that for the past four years she has had a leucorrheal discharge which had not existed previously. Her family physician having died, she did not consult any one, attaching no importance to the leucorrhea. For the past three weeks she has been having a bloody discharge.

Examination showed a thickened cervical stump, bleeding easily from the mucous membrane; in one angle there was a thickened, inflamed nodule, bleeding easily to the touch. The broad ligament was perceptibly infiltrated on the left and slightly so on the right. At the time of radium application a part of the thickened involved area was removed for diagnosis. Radium was applied to the canal in 650 mg. hours' dosage, and 300 mg. hours in the form of a needle were inserted in each of the bases of both broad ligaments. The pathologic examination of the specimen removed was that it was not malignant, but showed marked polypoid hyperplasia of the mucous membrane. From the subsequent history and local changes the lesion was carcinomatous and was not excised. The patient died within eight months from exhaustion and suppression of urine.

For fully ten years my rule in hysterectomies is to do a total removal of the uterus in all patients who have borne children. In nulliparous patients I leave the cervix except in instances of endocervicitis. In this instance the origin of the carcinoma was undoubtedly in the scar tissue of the cervical stump following its incision into the culdesac for the purpose of drainage.

I have for years followed this course of splitting the cervical stump into the culdesac when drainage was necessary for the purpose of insuring a patulous drainage canal after removal of the gauze. There have never been up to this time any undesirable sequellae. In the future a total hysterectomy will be done except where inadmissible.

DISCUSSION

DR. H. N. VINEBERG.—The very worst menopause symptoms I have observed were in women who had already reached the menopause. I maintain that if the ovaries are to be retained it is as necessary to retain them at the age of the climacteric as at an earlier age. Personally, I do not think they ought to be retained at any age, but they are just as important at the time of the menopause as earlier. In my opinion the retention of the ovaries without any uterine mucosa so that menstruation may continue, does not lessen, as a rule, the artificial climacteric and the retained ovaries not infrequently give rise to further trouble. Hence it is my practice to do a myomectomy whenever it is at all possible, and conserve the menstrual function.

DR. HEALY.—I take, though with some hesitation, issue with Dr. Vineberg. I believe that in younger women the ovaries should be conserved, but if you are going to conserve them you ought not to remove their blood and nerve supply. I think the ovaries should be removed if you cannot conserve the tubes and the blood and nerve supply. The fact that this one woman developed a cyst of the ovaries left at hysterectomy is not argument for always removing the ovaries when you can leave the tubes with them.

DR. A. J. RONGY.—Notwithstanding this instance of secondary involvement of the stump of the cervix after so-called hysterectomy, I think the greater amount of

safety to the larger number of patients will be secured if we do not attempt to remove the cervix in every case. I believe that the incidence of carcinoma in the stump of the cervix has been estimated at between 2 and 3 per cent. This small percentage would be entirely outweighed by the higher mortality if we should attempt always to remove the cervix. I have seen four cases of secondary involvement of the cervix after hysterectomy in over fifteen years. I think the incidence of large tumors deep in the pelvis is too great to risk endangering the lives of patients by always removing the cervix in these cases.

A point not brought out in the discussion is that in women who have a tendency to high blood pressure at the time of the menopause, this tendency is minimized by leaving the ovaries. The removal of the ovaries seems to have something to do with an increase in the blood pressure at the time of the menopause.

DR. BROUN (closing).—I realize that we can never agree on the question of the conservation of the ovaries, but I feel that it should not be impressed as a routine measure on every operator. I have seen so many who have been impressed with the importance of leaving the ovaries or parts of them irrespective of the case in hand, that they overlook the fact that if the ovaries are left and the tubes are removed the circulation of the ovaries will in all probability be impaired, especially in inflammatory cases. Under these conditions, while the patient recovers she stands a good chance of not being cured on account of pain. Instead of being a conservative measure the conservation of the ovaries has been a radical procedure under such conditions, and the interests of the patient have not been duly considered. Personally, I do not recall any patient who has complained because the ovaries were removed at the time of the menopause, but I have had a number of patients who said they were sorry I had left their ovaries, when they were no longer healthy.

In regard to the second case, twelve years ago we were not considering focal irritation as a cause of cancer and I cut through the cervix and drained the culdesac. I would not do this now with this case in view, because there has been a scar which caused irritation and was the cause of the carcinoma. In my hands following total hysterectomy recovery is just as smooth or a shade smoother than following supravaginal hysterectomy. Where the patient can stand it, it is only what we owe to her to remove the cervix.

DR. HEALY.—I would like to draw attention to one point. In the history of Dr. Broun's second patient, the woman had been married 20 years and for a great many years she had suffered from pelvic infection, presumably of Neisserian type and had extensive lesions of the tubes. This is exactly the type of case in which the cervix should be removed. If we go on the theory that there is anything in traumatic irritation as a source of cancer, certainly the cervix in which there has been chronic disease for many years is the cervix to be removed. As Dr. Rongy has said, it complicates a case a great deal to remove the cervix and these inflammatory cases in which the cervix should be removed are the most difficult in which to do it. We must take into consideration whether the final mortality will be greater in hysterectomy with removal of the cervix or when the cervix is left whether it will be greater from subsequent malignancy. In 18 years I do not believe I have seen 10 cases of cancer of the cervix where supravaginal hysterectomy has been done, so I feel that a diseased cervix should be removed if the patient's condition is good enough to withstand the additional time required to remove it. All cases cannot be treated in that broad way. One must consider the patient's condition at the time of operation rather than a possible carcinoma at some future date.

Dr. James C. Masson, of Rochester, Minn., read by invitation a paper on **Sarcoma of the Uterus.** (For original article see page 345.)

DISCUSSION

DR. JAMES EWING.—Dr. Masson emphasized the different types of sarcoma of the uterus, because from the laboratory standpoint that is the most impressive aspect of this subject. Different types of sarcoma occur in the cervix, parametrium, and endometrium, and in many gradations, all of which I do not pretend to be able to identify.

As a pathologist, I am impressed with Dr. Masson's breadth of information. We pathologists are likely to be limited in our information to the macroscopical and microscopical data obtained from the specimens and do not have the advantage of observing the cases clinically.

In regard to malignant changes in fibromyomata, I have seen only one sarcoma definitely derived from a myoma, and it was concluded that it was a myoma which had undergone sarcomatous degeneration. The gross specimen showed a multilobed myoma, three-fourths of which was myoma and the other one-fourth was entirely different, being edematous, cellular and distinctly malignant. Here we had an old myoma with a single lobe showing secondary changes of sarcomatous character. The sarcomatous portion of this growth was in contact with the endometrium and at this point had ulcerated through and infection had involved practically all the sarcomatous portion in a subacute inflammation. Other cases in which sarcomatous transformation of a myoma has been claimed have given a long history of myoma. In some instances there has been an exploration and a visual demonstration of the myoma, and then some years later there would be another operation and there would be discovered a rapidly growing sarcomatous tumor. There are a few instances of that sort in the literature.

There is another way to look at these sarcomatous myomata, and that is from the standpoint of the location of the tumor. There are certain myomata which one would naturally expect to be malignant; those are the heterotopic ones. Sarcomatous characters exist more frequently in myomata in the broad ligament. I have seen several myomas at a distance from the uterus, as in the cecal region and under the liver, where there may have been displaced wolffian rests, which were malignant from the start. We are all aware of the malignancy of polypoid myomata in children, and in adults polypoid myoma is apt to recur and to be malignant. If the myoma is in the ordinary location in the uterus there are slight chances of its becoming sarcomatous; if, however, it is heterotopic, it is likely to be malignant. Some forms of adenomyoma which are not a sarcomatous structure, are apt to run an unfavorable course because of the unusual attachment, which renders them difficult to extirpate completely.

As to the malignancy, there are other factors in connection with polypoid cervical myomas; they are nearly all incompletely removed, owing to the difficulty of extirpating all the involved tissue in the cervix and the remnant left recurs. These recurrences are apt to be more malignant and aggressive than the original growth.

It is an interesting feature in this report of Dr. Masson's that in 7000 or 8000 operations malignant changes in myomata occurred in rather less than 1 per cent. I think he is quite right in speaking of the unwisdom of attempting to discover every cellular focus and of the mistake of attributing unusual importance to them since this would increase the number of sarcomatous myomata and lead us astray in the interpretation of these cases.

DR. WILLIAM E. STUDDIFORD.—Personally my experience with sarcoma of the uterus is very limited, and I have been wondering whether many cases have been

overlooked in which there has been a sarcomatous change in the fibroid. Some time ago when the question of malignant changes in fibroid tumors was brought up I attempted to go over some material that had accumulated at Bellevue Hospital. At that time there was only one case recorded in which there was malignant change in a fibroid. Dr. Clark of Philadelphia told me that his material had shown very few changes in fibroids which were of a malignant nature, and very few recurrences. The pathologists have said that possibly some cases of malignant change had been overlooked, but few cases had been met in their examination of tumors. Possibly malignant changes might be found if repeated sections had been made.

As a matter of fact, I recall only four cases, one in a child two years old with sarcoma of the uterus, extending practically to the umbilicus, and that child died within a few weeks after the tumor was first discovered; the first symptom was bleeding from the vagina. In a second case a supravaginal hysterectomy had been performed for fibroids and sarcoma was found involving the endometrium. There was a rapid recurrence in the cervix. An attempt was made to enucleate the cervix and the woman died. The third case was one of melanotic sarcoma in a fibroid. Twelve years before she had had an eye removed for melanotic sarcoma. Of course the diagnosis rests entirely upon the microscopic findings and there is nothing in the symptoms to distinguish this condition from carcinoma. The same is true in fibroids.

The question of the possibility of malignant changes brings up the other question of complete as against supravaginal hysterectomy. I have always felt that the safe rule in operating on fibroids is, before the operation is completed, to have someone section the uterus to note whether there are any changes present other than those characteristic of every fibroid. Leaving out the question of malignancy, I think it is best to remove the cervix.

DR. JAMES CORSCADEN.—There are two things in connection with this subject of interest: (1) the frequency of sarcoma with myoma of the uterus and (2) whether there may not be some symptom or group of symptoms that would give a suspicion of the presence of sarcoma. With a mortality of supravaginal hysterectomy of less than 1 per cent. if the incidence of sarcoma with myoma is 1 per cent or more, it seems to me almost logical to do a hysterectomy for every myoma found on examination, and that would mean a large number of hysterectomies, for it is said that four out of ten women have fibromyoma uteri. As to the frequency, I have tried to find out something definite by looking at the statistics up to 1900. J. Riddle Goffe did the first modern hysterectomy in 1886. Bier in 1894 ligated the uterine arteries separately. This did not get into full swing, however, until 1900. Prior to that time these operations were considered very serious and operation for fibromyoma was performed only when the patient was suffering severely. Despite the fact that statistics are not very reliable, for many would call a condition sarcoma while others would call the same condition carcinoma, etc., there are no figures showing any great incidence of sarcoma of the uterus before the modern operation was performed. As to the incidence of sarcoma in cases of myoma treated by radium and x-rays, unless we underestimate the effect from the radium and x-rays, this treatment cannot destroy sarcoma. Twelve hundred milligram-hour doses will cause myomata to shrink. I do not know the effect of radium on known sarcoma. There have been a large number of myomata treated by radium since 1902, and if the incidence of sarcoma is high we should have a large mortality from neglected myomata, yet the only case I have found was Schoomacher's, which the patient was treated for myoma and afterward developed sarcoma. There must be many more such cases. In other words, I am interested from the patient's standpoint in knowing how many myomata, giving the microscopical picture of sarcoma, in time, are

going to kill the patient; that is really what we are trying to find out. In our 800 cases of myoma there have been four sarcomas, two without doubt and two doubtful. Dr. Vineberg referred one little girl whose pelvic viscera were so matted up that a specimen could not be removed. Under x-ray treatment it has practically disappeared. The other case is similar to those Dr. Ewing spoke of, the one with sarcoma of the broad ligament. The other two cases have been seen within the last two months and both had extremely acute histories. The one was forty-eight years of age, the other 52, both, in apparently good health, suddenly became ill and suffered from pressure symptoms and toxemia and high temperature indicating infection. In one there was intrauterine endometrial sarcoma filling the uterine cavity. The growth was composed of round cells not in the neighborhood of smooth muscle, recognized as such. The other growth was around the wall in close approximation to tissue that looked like ordinary myoma.

If one out of every 100 myomata will kill the patient by becoming a sarcoma we ought to forego every form of expectant treatment of myoma.

DR. EMIL SCHWARZ.—We are very fortunate in obtaining, through Dr. Masson, the statistics from one large institution. It might occur that there are discrepancies of opinion as regards malignancy when such tumors of the uterus are examined. The diagnosis seems to depend on the experience of the pathologist and the statistics giving proportions of myoma and sarcoma are often dependent on the locality on which the operations were performed. The fact that more hysterectomies are done on this side of the ocean than on the other side accounts for the varied incidence of sarcoma. The proportion between the benign and malignant stroma tumors is from 1 to 14 per cent, while a ten per cent occurrence is surely exaggerated. All the degrees of differentiation of the muscle cell into entirely undifferentiated round cells are found in these uterine tumors and rarely a doubt arises as regards malignancy although the degree of invasion probably depends on the amount of differentiation. A less differentiated tumor is probably more malignant, the sarcoma of the cervix is histogenetically entirely different from the corpus sarcoma, the origin is distinctly of an embryological character. I should like to mention in connection with the literature the name of Prof. Robert Meyer whose classical monographs on sarcoma of the uterus are outstanding for the excellent histological classification and brilliant scientific speculation. I think that well trained histologists encounter no difficulty in selecting suspicious portions of the tumor and the sectioning of ten or fifteen portions of myomata particularly by the freezing method does not appear warranted from the standpoint of a pathologist. Frozen sections rarely disclose delicate histological changes in tumors.

DR. WILLIAM CRAWFORD WHITE.—At Roosevelt Hospital from 1910 to 1922 there have been 1479 cases of fibromyoma uteri. In that same period we have recognized only two cases of sarcoma of the uterus, one in 1912 and the other in 1919; both were alive in 1922. In regard to what Dr. Masson said about radium and x-ray treatment, I do not see how any one can talk about radium for these cases because we cannot recognize when they are sarcoma in the early stages.

DR. VINEBERG.—I should like to put on record a case similar to the one Dr. Ewing spoke of. This case by all reasonable inferences had a myoma first and a sarcoma developed in the growth. The woman was about 53 years of age. She had a large tumor reaching midway between the umbilicus and the ensiform cartilage. It looked to me at the time as though it was nothing else than a fibroid tumor. The woman was suffering from pressure symptoms and I did a complete hysterectomy. However, in removing the adnexa and the cervix, as it was such a large tumor and there was some ascitic fluid in the peritoneal cavity, I asked the pathologist to examine it very carefully. The pathologist of Mt. Sinai Hospital reported it as a

simple fibromyoma. Six months later the woman returned with an enormous recurrent growth and then the tumor was reexamined and found to contain sarcomatous cells in certain areas.

Another very interesting case was that of a woman operated upon by another surgeon who did a supravaginal hysterectomy for supposed fibroids. The woman came back one year later complaining of pain in both sides of the abdomen and in both lower quadrants. A growth could be made out on both sides. I was not sure whether they were the retained ovaries or a new growth, but learned that the ovaries had been removed. The patient was suffering so very severely that I operated and found retroperitoneal growths lying practically on the deep pelvic vessels. The growths were removed and found to be sarcomas. Six to nine months later the woman returned with recurrent nodules. She was then treated with radium and x-rays and these nodules have disappeared and though she still has the cervix intact, she is entirely free from recurrences. It was ascertained that a further microscopic examination of the uterine growth showed it to contain sarcomatous elements. Another case is one to which Dr. Corscaden referred. This patient was a young girl ten or twelve years of age, operated upon at the French Hospital for appendicitis. It was stated that at the time of the operation a sarcoma of the uterus was detected but was not removed. As the little girl was suffering a great deal of pain and discomfort it was decided to do an exploratory laparotomy. This showed a growth that evidently was in the walls of the uterus. The omentum was extensively adherent to the tumor. An attempt was made to excise the tumor for examination, but the hemorrhage became so profuse that we desisted from further interference and closed the abdomen. That patient has been treated by Dr. Corscaden and there is absolutely no evidence of growth at the present time. The only disconcerting feature at present is that there is a great deal of thickening and induration of the anterior abdominal parietes.

DR. BROUN.—At the Woman's Hospital in 1800 to 1900 consecutive cases, there has been found less than 0.4 of 1 per cent sarcoma.

DR. HEALY.—I think the variability of the incidence of sarcoma in uterine fibroids is very striking. We have been told 0.4 per cent at the Woman's Hospital and Dr. White has stated that at the Roosevelt Hospital among 1500 cases covering a period of 12 years there have been only two cases indentified histologically as probable sarcoma. This indicates that there is a great variability in the type of tissue identified as sarcomatous at different institutions. At Roosevelt we are not in the habit of doing a complete hysterectomy for fibromyoma uteri unless there is some complication requiring drainage of the pelvis into the vagina. So, bearing in mind that a very large number of operations for fibromyoma uteri are done by supravaginal hysterectomy and in many cases the adnexae are left, it is quite possible that sarcoma has been overlooked, and this being the case one would expect to find a small number of local recurrences of sarcoma in the pelvis. We have not discovered such cases in our follow-up work which is fairly accurate and this leads me to believe the findings nearly correct for our group of cases for we have practically seen no cases of sarcoma. If sarcoma has been present it has been encapsulated and has not broken through.

DR. MASSON, (closing).—The points brought out in the discussion are just the ones that have been worrying me in my study of the subject. My attention has not been brought to the 1 per cent of cases in which the growth was outside the uterus. I shall be interested to follow Dr. Ewing's suggestion and to observe whether the greater percentage of malignancies are those separated from the uterus, such as those of the broad or round ligaments.

I believe that in removing myomas we should insist that a pathologist examine the specimen before the operation is completed. Sarcoma cannot be detected from its

gross appearance, therefore, a trained pathologist should examine specimens before the patient leaves the operating table. Unfortunately, the number of trained pathologists is limited, and it is difficult to judge the incidence of sarcoma in fibromyoma from statistics, because those classified as malignant in one hospital are not so classified in another.

I am sure that a great many fibromyomas are removed and the malignancy not recognized. No doubt the spindle-cell type of myosarcoma is a condition much less malignant than the small-cell or oval-cell sarcoma found in the endometrium. I believe myomectomy has saved many lives from malignancy when malignancy was not suspected by the surgeon.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

Protein Therapy and Non-Specific Resistance

BY HUGO EHRENFEST, M.D., ST. LOUIS, MO.

WITHIN the comparatively short time of about seven years, non-specific protein therapy has gained a firm foothold in clinical thought and practice. Well in accord with the generally noted trend of modern gynecology to supplant operative procedures, notably in so far as they imply the removal of organs, with nonoperative and thus truly conserving measures, also the gynecologist has exhibited keen interest in this new type of therapy. Proper appreciation of these recent efforts (reflected in the appended group of Selected Abstracts) presupposes familiarity with the biologic principles underlying this form of treatment. This information can now be readily obtained from a volume on *Protein Therapy and Non-Specific Resistance* by William F. Petersen, which covers the entire problem in a most exhaustive and authoritative manner. From this work I shall quote certain facts which not only elucidate the essential principles of this method but also tend to show that stimulation of nonspecific reaction by the injection of foreign proteins represents a novel and probably valuable addition to the gynecologic therapeutic armamentarium in combating inflammatory processes of the internal genitalia.

The idea of therapy on a nonspecific basis, at first glance, seems a step backward. The study of the causal relation of microorganisms to certain diseases, started by Pasteur and Koch, the long known clinical fact that certain infections lead to the development of specific immunities, and finally therapeutic results with specific sera and vaccines, ushered in by the work of Behring, have led to that specific ideation on which modern medical science is largely founded. Naturally enough in such a period of successful achievement clinical observations that did not fit in with the prevailing mode of thought were but half-heartedly put forward and soon passed into oblivion.

The present interest in nonspecific therapy did not originate on the basis of a convincing theory or promising laboratory experimentation. It was the clinic that forced attention to certain therapeutic results which could neither be ignored nor reconciled with prevailing conceptions of the mechanism of recovery from disease.

In 1893 Fraenkel reported on the treatment of 57 cases of typhoid fever with subcutaneous injections of typhoid bacilli. In an address, delivered at the same time, Rumpf presented a similar series of ty-

phoid patients with equal success treated with a pyocyaneous vaccine. He called attention to the reaction following the injections in the form of chills and sweating and the subsequent euphoria. Published at a time that witnessed the successful introduction of diphtheria and tetanus antitoxin, Rumpf's paper was practically ignored. Approximately at the same time Kuehne had analyzed the tuberculins and noted the large amount of protein split products therein contained. Koch himself was cognizant of the fact that the fever-producing element in the tuberculins was not part of the specific effect which he was seeking to accentuate. Hueppe, Scholl and others insisted that it was just this nonspecific bacterial protein which accounted for the entire tuberculin reaction. These findings and clinical observations finally led to the experiments of Matthes and Krehl (about 1895) with protein split products in tuberculous animals. In employing various proteins they discovered that also milk injections would activate the focus.

To the same period also belongs the reintroduction of the artificial abscess, the sterile fixation abscess (e.g., produced by the injection of turpentine), with apparent success used by Fochier in puerperal infections.

Nucleic acid and its salts were used in a similar manner, and for about two decades extensively employed with seeming success. These injections caused a leucocytic reaction supposedly expressing a favorable general tissue stimulation.

Collodial metals, especially silver preparations, had come into more general use after their introduction by Credé. They first were thought to possess specific streptococcicidal properties, but finally the colloidal metals have come to be recognized as nonspecific, purely reactive agents.

Autoserotherapy, introduced in 1894 by Gilbert for the treatment of pleurisy and consisting in the subcutaneous reinjection of pleuritic exudate, belongs in the same category of therapeusis. The resulting benefit after further investigation was definitely ascribed to the leucocytosis that usually follows the injection.

There are two related measures to be found in tumor therapy, viz., the trypsin treatment of Beard, and the fluid of Coley, supposed to be particularly useful in sarcoma. The injections of both agents are followed by a severe reaction—chill, fever, increased local pain, evidences of inflammatory reaction, occasionally followed by clinical improvement. These reactions are now known as typical nonspecific phenomena.

Another nonspecific method, at times followed by good clincial results, has been that of the injection of leucocytic extracts in patients ill from various infectious diseases. It has been found, e.g., by Opie, that such injections had a very decided protective effect against infections. But also these results probably are to be explained on the basis of a nonspecific reaction.

Between 1890 and 1910 reports began to become more frequent which detailed successes through a number of therapeutic measures, purely nonspecific in character (e.g., normal serum and diphtheria antitoxin in the treatment of tuberculosis, arthritis or cerebrospinal meningitis). This paraspecific serotherapy has been extensively used

in France, and its rationale more recently has been thoroughly discussed by Cumston (New York Med. Jour., 1918, cviii, 903).

Yeast has been employed for many years in the assumption that it augments the resisting powers of the body. Yeast extracts have also been given subcutaneously for the same purpose.

In the group of nonspecific therapy of infectious diseases also belong some of the efforts of administering mixtures of various vaccines.

We thus have a large list of agents employed, some empirically, others on definite immunologic theories, but all, whether bacteriologic products, enzymes or chemicals. producing a more or less marked constitutional reaction. It is curious that this common feature was not emphasized or even recognized as a possible part of the therapeutic mechanism.

Throughout the period under discussion vaccinotherapy as advocated by Wright was being tried out, not always with success, but with sufficient result to keep the method in use. In general, however, the therapeutic results certainly did not measure up to expectation. As a matter of fact it is this work with vaccines which ultimately led to the modern conception of protein therapy and nonspecific resistance. The idea of strict specificity of such vaccines, built up in the laboratory, had to give way to the definite clinical demonstration of the equal effectiveness of heterobacteriotherapy. This marks the real beginning of the recognition of nonspecific therapy. Corroborative clinical evidence quickly appeared from a number of European hospitals in a great number of various diseases.

From heterobacteriotherapy it was but a logical step to the intravenous and subcutaneous injection of bacterial components and bacterial split products, then to protein split products of nonbacterial origin, and finally to the realization that any substance which is capable of inducing the shock reaction on the part of the patient would result in general in the same therapeutic change. Soon a number of other agents were so used, milk, proteoses, albumoses. hypertonic salt solution, etc. Distilled water and foreign sera soon were added, and more recently the ancient method of producing sterile abscesses by the injection of turpentine or hypertonic salt solution has been revived. It was recognized too that some of the older agents, nucleic acid, colloidal metals. enzymes, lipoids, etc.. all belonged in the same category. They all brought about a general reaction which manifested itself as a rule in a chill. fever and leucocytosis.

In the nonspecific therapy, as now widely employed. chiefly in European clinics, the following substances seem most often used: ovalbumin, seralbumin, milk. fat-free milk, casein, gelatin, nucleoprotein (plant proteins), and protein split products such as proteoses, deuteroalbumose, histamine, globin and peptone.

Milk and certain special milk products at present seem most favored by gynecologists and, therefore, it will prove interesting to mention here further details concerning their use. The intramuscular injection of milk was introduced by Schmidt and by Saxl in 1916 to induce a protein reaction. Milk offered the great advantage of being always available. Ordinary pasteurized (or fresh) milk is boiled for from five to ten minutes. After having been cooled off. from 5 to 10 c.c. are injected intraglutcally, or into the muscles of arm or back.

The injection is followed in some instances by a chill (not so severe as that following a typhoid vaccine injection), and by a rise in temperature that reaches its maximum in from 6 to 8 hours and then subsides within 24 hours. A well marked leucocytosis, ranging from 15 to 40 thousands also results. Milk, so injected, has a decided styptic effect and, as shown by Doellken, is of particular value in diseases associated with hemorrhage. Thrombokinase and fibrinogen appear in increased amounts in the serum after the injection. Locally there may be considerable pain at the site of injection.

It is believed by some investigators that the intensity of the reaction is wholly dependent upon the bacterial contents of the milk. Fresh sterile milk seems to cause less reaction. When milk injections are repeated the reactions may be successively augmented, differing in this respect from the effect of reinjections when bacteria or proteoses are employed. There seems to be little danger of sensitization or of anaphylactic shock from repeated injections of milk. Some later observers are of the opinion that milk preparations (caseosan, etc.) are more apt to be followed by shock symptoms. Other writers assume that such symptoms develop only if inadvertently the injection had been made directly into a vein. It has been suggested to use human milk in preference to cow's milk. For intravenous use a special fat-free milk has been prepared.

Lindig and Mueller attempted to refine the milk therapy by employing purified casein in place of milk. This would represent a chemically constant product, free from bacteria. Thus a standard dosage might be determined. Lindig used one-half to one c.c. of a 5 per cent solution of casein, Mueller in a similar way Aolan, which seems practically identical with another preparation named Caseosan.

It would lead too far to describe here in detail the general and focal reactions and their assumed biologic origin, or present even only a résumé of the claimed results of nonspecific therapy in a great variety of diseases, including gonorrhea and its complications, and other conditions often seen in gynecologic work. The reader is referred for this information to Petersen's book.

Protein therapy with proper dosage, in Petersen's experience, offers a potent, perhaps the most potent, method that we have at our command of altering the current of cellular activity in two diametrically opposite directions—acceleration and depression of function. Treatment under proper dosage results first in a well marked stimulation without clinically apparent fatigue (brought on only by a toxic or too large a dose), and if continued for a period of time this alteration of acceleration and subsequent retardation of metabolic processes becomes clinically manifest in increased weight and general well being.

But as with all new therapeutic procedures there still exists great uncertainty as to the proper dosage. This is especially true for this therapy since the dose to some extent depends on the vigor of the patient, on the type of infection, as well as on the stage of the disease. There is no unanimity as yet whether it is preferable to give one or two fairly large injections or several smaller ones. Whatever method is followed, extreme caution is required. In general it must be kept in mind that the first injections should be given early in the course of the disease; that the individual injection must be given slowly; that

a relatively small dose should be given at the first time, and that care must be taken, if the injections are given intramuscularly, that the agent is not by accident introduced directly into a vein.

The nonspecific method of treatment should under no circumstance be considered as a rival or substitute for the proved specific measures that we have at our command.

The severe reaction likely to follow the injection renders it imperative not to employ this therapy in any patient who does not seem a good clinical risk, or would not seem well able to bear the additional strain of a possible violent reaction. Therapeutic results furthermore cannot be expected when the organism of the patient is no longer capable of responding to stimulation, representing the first phase of the reaction.

Care must be taken to obtain all possible information concerning particular hypersensitiveness on the part of the patient such as a history of serum sickness, asthma, urticaria, angioneurotic edema, or also of epilepsy or other grave nervous instability. In such cases the more active agents must not be used.

Pregnancy must be similarly regarded as an absolute contraindication. Great caution will have to be observed in most cardiac lesions, and especially in the presence of signs of incompensation. Diabetics by most writers are pronounced as unfit subjects for this newer therapy.

Nonspecific therapy actually requires more judgment, more careful attention and bedside study than almost any other therapeutic procedure. It should never be a routine procedure.

REFERENCE

Petersen, William F.: Protein Therapy and Non-Specific Resistance. The Macmillan Company, New York, 1922.

Selected Abstracts

Protein Therapy in Obstetrics and Gynecology

v. Jaschke: Experiences with Protein-body Therapy in Obstetrics and Gynecology. Therapeutische Halbmonatshefte, 1921, xxxv, 539.

The parenteral administration of foreign proteins has been employed only recently as a therapeutic measure in obstetrics and gynecology. Excellent results have, however, been obtained by the use of soluble casein (Caseosan-Heyden) in puerperal fever, parametritides, and especially in peritoneal and genital tuberculosis. It appears that the good results are due, not entirely to the hyperleucocytosis, for in certain cases this did not appear, but rather to an activation of protoplasm, an increased functional capacity of the most varying systems of organs. This effect is, however, only obtained with proper dosage, otherwise there may even be induced a state of "proteinogenous cachexia."

Specific antibodies are produced in the body by the Caseosan-injections, and may be demonstrated by the technic of Salomon. The antibody titre should be determined before treatment, and where any considerable amount is present the

initial dose of Caseosan should be small, (0.1-0.5 c.c.) and is better administered intramuscularly than intravenously. Where the antibody content of the serum before treatment is low, an initial dose of 0.5 c.c. intravenously may be given. The therapy is usually far more efficient in the cases where the initial antibody content is low.

Better results are obtained in the chronic infections, especially the tuberculous infections in which often marvelous therapeutic effects are obtained. In the acute puerperal conditions the beneficial effects usually appear too late to save the life of the patient, though occasionally even severe cases of bacteremia have been healed. Other indications for its use are nonpuerperal parametritis, pelvic inflammatory disease, and carcinoma, in the operable cases before operation, to increase the general resistance, in inoperable cases as an adjunct to radiotherapy.

MARGARET SCHULZE.

Gellhorn: The Treatment of Pelvic Infections by Injections of Milk. Journal Missouri State Medical Association, 1922, xix, 341.

While admitting its limitations, Gellhorn is quite well pleased with his results in the treatment of pelvic infections by the injection of sterile milk. He believes that in the majority of cases a cure can be effected without pain, risk, or mutilation where formerly only serious operations gave promise of relief.

From personal observations as well as a study of the literature, Gellhorn gains the impression that the tubes, the uterus, and possibly the bladder are most favorably influenced by foreign protein therapy. The ovaries seem to remain refractory. Of infections, he believes that gonorrheal foci offer a more favorable prognosis, although other infections also respond in some instances. Since gonorrheal infection of the cervix is not influenced, this ought to be treated independently to avoid reinfections.

While milk is not the only protein which may be used, Gellhorn prefers it because it is readily procurable and inexpensive. He uses ordinary whole milk which is sterilized either by boiling in a water-bath for 10 minutes or, preferably, by pasteurizing at 80° C. for an hour on six successive days. From 5 to 10 c.c. is injected into the gluteal musculature and the injection repeated every three to five days until from 4 to 12 injections have been given. The reaction occurs after from 6 to 8 hours, the fever ranging from 100° to 104°.

R. E. WOBUS.

Nussbaum: Stimulation (Schwellenreiz) Therapy in the Treatment of Febrile Abortion. Zentralblatt für Gynäkologie, 1922, xlvi, 424.

The importance of the treatment of abortion has markedly increased in Germany since the war, inasmuch as approximately 87 per cent of pregnancies have ended in abortion and 78 per cent of these are provoked abortions. The mortality from abortions has risen since the war from 3000 to 5000.

The problem of abortion is not only a medical but a national question, and the treatment is of the utmost importance. There seems no common ground for the believers either in active or in conservative therapy. Indeed, therapy is almost useless when the infective process has passed the uterus itself, and here so many suggestions are made as to treatment that it is doubtful whether any are of value. Von Jaschke, after a survey of the literature, came to the conclusion that there could be no standard of treatment, and the propriety of any measure could be judged only by its success or failure in any given case. He believed that the bacteriologic examination was of little value, and recommended active therapy (emptying the uterus) in every case.

The German scientific world is divided into two camps, and each seems satisfied that the other has nothing better to offer in the way of results. Nussbaum asks, is it possible to decrease the mortality?

Up till now the clinical appearance and the bacteriologic invader have been looked upon as the only factors in the prognosis. He would consider the question of fever as important from the biological standpoint, and quotes Walthard to the effect that the most important factors in the question of puerperal fever today are the antibodies in the blood and tissue fluids. Fever is the measure of the relationship between the individual and bacteria. Fever is not a disease, but only a symptom—a factor in the process of immunity, and treatment should be directed to stimulate this reaction process.

The activation of protoplasm was for a long time attempted by means of the injection of inorganic salts, such as those of silver and gold. It is known that leucocytosis, activation of protoplasm, and fever are the results of a similar process.

Nussbaum analyses 1122 abortions on the basis of fever, the most important of the three factors noted above, and would make fever an important factor in prognosis. He suggests (1) that general treatment must begin with the first sign of elevation of temperature; and (2) that, after two and a half days of conservative local treatment, the uterus should be emptied regardless of the temperature. To the injection of an activating substance there are three reactions—local, focal, and general. The focal reaction is the one of importance in estimating the value of treatment, inasmuch as there should be little or slight local reaction at the point of injection, no depressing general reaction, and only a focal reaction. The agent employed should be sterilized and nonpoisonous, and not an uncontrollable mixture (milk). The ideal agent is Jatren-Kasein.

With the injection of this agent the most valuable clinical control is the temperature. If the fever falls after the injection, the individual, activated to a maximum, is in control of the infection. If the fever rises after the injection, the maximum dose has not been given. If it continues to rise after several injections, resistance cannot be increased. The longer the fever persists, the more the individual is weakened in reaction activity, and so focal reaction will be apparent with smaller dosage. The shorter the fever, the higher the activity, and therefore a greater dose should be given in order to reach the maximum in this period. The earlier the injection—best in the rise of fever—the more quickly is resistance increased and infection overcome.

In brief, treatment has been divided into two categories—the active, where the uterus is emptied at once, and the passive, where in the presence of hemolytic streptococci nothing is done, with the possible middle course of passivity for two and one-half days in the case of hemolytic streptococci, in the hope that in this time the fever will disappear.

Nussbaum, in his analysis of 1122 cases, has discovered that cases febrile for two and one-half days before and after emptying the uterus have a doubtful prognosis, and believes that treatment should begin immediately with the onset of fever. Based on the Bier-Zimmer activation therapy, he has used Jatren-Kasein with remarkable results in his cases. The standard of focal reaction he finds in the temperature curve, as noted above. He recommends in fever lasting more than two and one-half days, 2 cm. Jatren-Kasein every second day until the temperature falls, and then every second day 1 cm. until the temperature is normal. With fever of less than two and one-half days' duration, 5 cm. of Jatren-Kasein are injected and then every second day 2 cm. until the temperature is normal.   H. M. LITTLE.

Simon: **Protein Therapy in Febrile Abortions.** Zentralblatt für Gynäkologie, 1922, xliv, 1837.

Simon recommends protein therapy with albusol. He has worked out the optimal dose by means of the leucocyte count and proved that it was without danger from anaphylaxis when repeated. Thirty febrile abortions, of these 19 with fever over 38.4° C., were treated. Only two had more than two days of fever after the injection; in eleven others where the fever had already lasted four days, three only had more than five days of fever. Twenty-six cases of puerperal infection were treated with albusol; the results in this group were extremely satisfactory.   H. M. LITTLE.

Weinzierl: **Experiences with Casein Therapy.** Deutsche Medizinische Wochenschrift, 1921, xlvii, 1120.

Intragluteal injections of sterile milk were used at the University of Prague in cases of adnexal inflammation of gonorrheal or undetermined origin. The results were disappointing for, although there was an exacerbation of the inflammatory process with accompanying fever and pain as well as local reaction up to abscess formation at the site of injection, the therapeutic results were very slight. Thereupon a commercial preparation of casein under the name of Caseosan was given an extensive trial. Again the therapeutic results were, on the whole, negligible. In 10 cases of puerperal fever of a milder type, Weinzier is of the opinion that certain beneficial results were achieved. In 4 cases of real puerperal sepsis the result was practically nil, three of the four patients dying.
                                                      R. E. WOBUS.

Sklarz, E., and Massur, Fr. W.: **Paralysis of Accommodation after Injection of Caseosan.** Medizinische Klinik, 1921, xvii, 346.

They observed a case in which intravenous injection of Caseosan (0.5 c.c.) gave a very severe general reaction, (temperature 40.5° C.). Four days later the patient was given 1.0 c.c. of the same drug intravenously without any general reaction. Within a short time there appeared a bilateral paralysis of accommodation, which persisted for eight days and finally disappeared spontaneously.
                                                      E. D. PLASS.

Stegeman, H.: **Treatment of Pelveo-Peritonitic Adnextumors of Puerperal and Nonpuerperal Origin with Injections of Turpentine or Milk.** Inaugural Dissertation, Kiel, 1920.

This monograph considers exhaustively the entire problem. Outside of a thorough study of the literature on the subject the writer presents a careful analysis of 100 patients treated in the Frauenklinik in Kiel, 70 of them with injections of turpentine, 30 of milk. As a whole, reactions—both general and local—were less pronounced with turpentine, the milk cases developing fever more often. In comparing certain commercial products like *Terpichin* or *Novoterpen* with turpentine, or, on the other hand, *Aclan* or *Caseosan* with simple milk, he was unable to establish any advantage of the commercial products. With turpentine 18.5 per cent of the 70 cases were cured, 37.2 per cent improved, leaving 44.3 per cent of total failures. The results with milk were: 20.5 per cent cured, 50 per cent improved, 30 per cent failures. In comparing these results with those obtained by Giesecke with diathermy in afebrile adnexal inflammations (in 220 cases: 54.6 per cent cured, 39.1 per cent improved, only 6.3 per

cent failures) the author is compelled to conclude that in the afebrile cases diathermy should be the method of choice.

In spite of these results the author will not deny certain advantages of this newer mode of treatment. (1) It is easier to keep the acute and subacute cases in bed at least while the injections are given. (2) General condition tends to improve and pain to subside. (3) Temperature may be lowered. (4) Reaction may give a clue in the differential diagnosis between an inflammatory mass and a neoplasm. (5) The injections have a good suggestive effect.   HUGO EHRENFEST.

Sonnenfeld: The Treatment of the Adnexa with Turpentine or Caseosan.   Zentralblatt für Gynäkologie, 1921, xlv, 686.

The method is an extraordinary advance in the treatment of inflammatory tumors of the adnexa. The advantage is that it causes the least trouble to the patient, and gives the most prompt results. He gave injections every second day. Referring to the work of Brewitt Sonnenfeld suggests six to eight injections of turpentine prior to operation for pyosalpinx. Terpichin he considers better than turpentine and both better than Caseosan.   H. M. LITTLE.

Bochenski, K: Colloids and Non-Specific Proteins in Gynecology and Obstetrics. Polska Gazeta Lekarska, 1922, i, 542 and Journal American Medical Association, 1922, lxxix, 1808.

There is not much difference in action between different colloids and the non-specific proteids commonly used. Local and general reactions depend more on the constitutional condition of the patient than on the substance used. In general milder cases reacted very favorably, graver, much less. He recommends early use of colloidal and protein injections in puerperal infections, perimetritis and parametritis, acute, subacute, and chronic inflammatory processes of the adnexa. The substances used were silver salts, milk and turpentine, the last in 1 c.c. doses of 15 per cent oil of turpentine solution. Most of the injections were given intramuscularly. The author warns also that the good effects frequently were only temporary, and this indicates that surgical measures should not be neglected or delayed.

Seelmann: Treatment of Adnexal Disease with Turpentine.   Zentralblatt für Gynäkologie, 1921, xlv, 1221.

From January 1, 1920, to May, 1921, 200 cases of salpingitis were treated by the injection of 1 cm. of 20 per cent turpentine oil in the gluteal region. There was pain which lasted three or four days, but the patients voluntarily returned for the treatment. Seelmann contended that turpentine brought on a focal reaction with subsequent fever and leucocytosis up to 30,000. His results were favorable, the time of treatment was shortened, the pain was lessened, and the tumors decreased in size. The subacute cases often gave the most marked reactions. The treatment is contraindicated in tuberculous conditions. It is particularly advantageous in gonorrheal infections. Heart disease and pulmonary tuberculosis would appear to be contraindications to the treatment. The treatment of adnexal disease in the puerperium is inadvisable as it is liable to produce vomiting in the child, although the repeated examination of the milk fails to reveal the presence of turpentine.   H. M. LITTLE.

Baum, Friederich: Injections of Turpentine in Inflammation of Adnexa. Medizinische Klinik, 1921, xvii, 376.

Baum used the following mixture: Ol. therebint. 4.0, Eucupin 0.2, Ol. olivarum 16.0.

He injected 0.5 cm. every four days into the buttocks, never more than 12 injections in a series. No abscess formation was noted.

The distribution of the cases and the results of treatment are as follows:

I. *Uncomplicated pyosalpinx*—27; (1) Recent process—21: cured—15, improved—2, incompletely treated—4. (2) Chronic process—6: cured—3, improved—3.

II. *Pyosalpinx with exudate*—51; (1) Recent process—36: cured—16, improved—15, unimproved—4, incompletely treated—2. (2) Chronic cases—14: cured—3, improved—5, unimproved—3, incompletely treated—3.

III. *Parametritic exudate*—13; (1) Recent—11: cured—9, not cured—2. (2) Chronic cases—2: well absorbed—2.

IV. *Slight adnexal inflammation*—8; (1) Recent cases—5: cured—5. (2) Chronic cases—3: cured—1, improved—2.

E. D. PLASS.

Nystroem, Bruno: Treatment of Inflammatory Conditions of the Uterine Adnexa with Turpentine Injections. Finska Laekaresaellskapets Handlingar, 1922, lxiv, 575.

The writer records the results obtained with this form of treatment in 39 acute and 24 chronic cases of adnexal inflammation. He is convinced that in a large number of the cases the treatment hastened recovery. This holds true in particular for the acute and subacute cases, and especially for perimetritis and parametritis. A favorable effect, however, could also be noticed in the chronic conditions.

Nevertheless he is not willing to subscribe to the very enthusiastic reports that have come from a few clinics as regards the effect of this treatment in the acute cases. In the monotony of the old customary form of therapy, wearing on patient and physician, it is satisfactory to know that this newer method will never do harm if properly applied, but at least in some instances will hasten the resorption of exudates and thus help to improve more speedily the general condition of the patient.

AUTHOR'S ABSTRACT.

Hellendall: The Treatment of Inflammatory Disease of the Adnexa by Means of Turpentine Injections. Zentralblatt für Gynäkologie, 1921, xlv, 1864.

This writer has no satisfaction with turpentine or terpichin and believes that the injections were without any effect.

H. M. LITTLE.

Kronenberg: Turpentine Injection in Inflammatory Disease of the Adnexa. Zentralblatt für Gynäkologie, 1921, xlv, 257.

He claims that turpentine has no effect on the kidneys. There was a mild rise of temperature after one-quarter to one-third of the injections. Improvement in the general condition was observed only in a few cases. No abscesses developed at the point of injection; pain is infrequent. His results from this local inoculation of turpentine were as follows: In by far the majority of cases there was no effect on the general condition. There was no shortening of the time of treatment in adnexal condition. No ill effects from the procedure were seen. Usually a leucocytosis developed where the blood count had previously been normal. Where there was a leucocytosis the injections caused it to decrease, followed later again by increased leucocytosis.

H. M. LITTLE.

Gauss: **Results of Intravenous Therapy in Uncomplicated Gonorrhea in the Female.** Zentralblatt für Gynäkologie, 1922, xlvi, 977.

Repeated admission of infected women, who had been discharged as cured, made it probable, that in such women there persisted a latent gonorrhea difficult to diagnose. The technic was improved and many more gonococci were found than previously. Instead of the typical microscopic picture of intracellular groups of gonococci, in them frequently single gram negative diplococci, these often extracellular, were found.

It was evident that local treatment was in no way satisfactory, and extremely deceptive as regards apparent cure. The results with vaccines and certain chemicals given hypodermically had been particularly good in inclosed gonorrhea (epididymitis, arthritis, pyosalpinx, pyovarium), but there was very little known about their effect in infections of open mucous surfaces. Gauss determined to determine this point and to see whether results could not be improved, by using intravenous in place of the intramuscular applications, the latter allowing more exact dosage. About eight to ten injections were usually given, and then the effect controlled. About 135 women suffering from uncomplicated gonorrhea were treated and studied.

1. *Vaccine therapy.* Arthigon was tried first, but owing to the large quantity required, it was not suitable for intravenous injections. Next gonargin was used. Of 52 cases, 73 per cent were cured, of the acute cases 56.3, of subacute 78.2, and of chronic cases 84.6 per cent. It was obvious that the previous belief that uncomplicated open mucous membranous gonorrhea did not react was incorrect, and secondly that cure could be accomplished in a great proportion of cases.

Gonotropin was tried in 7 cases, successfully in 57.1 per cent. Some six cases were treated with autogenous vaccine, satisfactorily in about half. This again was contrary to common opinion.

2. *Chemical therapeutics.* Forty-three cases were treated with intravenous injection of collargol, 65.5 per cent satisfactorily. There was no accessory local treatment. The combination of silver and copper supplied by Merck was tried in several cases and found to markedly influence the progress of the disease. A gold preparation, chrysolgan, together with intramuscular application of salicylate of mercury, was tried in some 20 cases, 50 per cent of which were apparently cured.

So far as results were concerned all of these treatments seemed more or less on a par, and all the results were good, inversely accordingly as the diseases were acute, subacute, or chronic. The duration of treatment varied from five weeks with gold mercury to two weeks with collargol, an average of six or seven weeks. Only autovaccine was apparently free from distressing complications. With the other methods there was more or less severe headache and fever, which was remarkably so with the use of collargol. Also with collargol there was evidence of kidney inflammation after the injections. Perivascular inflammatory reaction was fairly frequent. The gold preparation was followed in three cases by unpleasant toxic symptoms.

Gonotropin would seem to be the most satisfactory form of treatment. Most important seems the fact that autogenous vaccine has a place in the treatment of uncomplicated open mucous membranous gonorrhea. Its effect is due not to a specific immunization but to a more or less general protein immunization. The action of the metallic salts is so indefinite that Gauss was forced to conclude that the result in some cases was due to spontaneous healing. Experiments with ordinary salt solution showed that the disease improved markedly. Salt solution and even distilled water gave similar results as the injection of protein bodies. Gauss believed that this was due to the precipitation of protein from the body fluids and the alteration in their concentration with resultant general stimulation of the body reaction. Whether this is called protein therapy, activation of proteoplasma, unspecific stimulation, or curative inflammatory reaction, is of comparatively little importance.   H. M. LITTLE.

Book Reviews

X-Ray Dosage in Treatment and Radiography. By WILLIAM DANIEL WITHERBEE, M.D., and JOHN REMER, M.D. The McMillan Co., New York, 1922. Price $1.75.

This is a little pocket manual of 118 pages designed for every class of practitioner including the specialist.

X-ray dosage, unfiltered and filtered and x-ray burns are discussed in the first 40 pages. The remainder of the book is devoted to the treatment of focal infections of the tonsils, tonsils and adenoids associated with exophthalmic goitre and tuberculous glands, and the treatment of skin diseases.

We trust that no practitioner will venture to practice radiotherapy based solely upon the slender guidance of this well written compend.

R. T. FRANK.

Diseases of Women. By HARRY STURGEON CROSSEN, M.D., F.A.C.S. Fifth Edition Revised and Enlarged. With 934 engravings, including one color plate. Large Octavo. pages 1005, St. Louis, C. V. Mosby Co. Price $10.00.

Crossen's is, on the whole, a most satisfactory book because it not only covers the subject of diseases of women adequately, but also completely and thoroughly. Nothing is taken for granted. If one desires to look up new procedures, as for example the Rubin test for determining the patency of the fallopian tubes, a complete description, making further search of the literature unnecessary, is found within its pages. The introductory chapters alone cover 238 pages. In a fifth edition of a book as well known as Crossen's it is unnecessary to give a detailed description of the contents. Not only are all the diseases of the female pelvic organs taken up, but as has become more and more the fashion, the glands of internal secretion are given a chapter (Ehrenfest), other organs are considered in their relation to gynecology, and medicolegal points are touched upon. The text throughout retains its clearness. The careful paragraphing of the previous editions remains in evidence. Sometimes the overpainstaking arrangement becomes a bit wearisome, but this fault is compensated for by the ease of reference.

A large number of unusually good photomicrographs of pathological conditions are worthy of special commendation (O. H. Schwarz and R. E. Wobus). The illustrations of gross conditions, as in previous editions, are partly culled from a great variety of sources, partly taken from photographs of the author's material and partly drawn by Jones and Summers, consequently great unevenness exists, some being excellent, others distinctly mediocre. Figures 55, 370, 505 might well be omitted or replaced by better illustrations. The reviewer suggests that Fig. 589 be credited to Bumm, instead of Williams. Fig. 528 represents any hyperkeratosis and is in no way characteristic of syphilis.

The stand taken by Crossen on most moot questions is most laudable. He is a firm advocate, as are most of the fully trained gynecologists, of specimen excision and diagnostic curettage. He classifies the suddenly rediscovered risk of cutting

through a suspect area as a phobia and hysteria "due largely to certain leaders in the profession who have permitted themselves to make loose statements too sweeping in character or so ambiguous in construction as to promote erroneous interpretation." With this view the reviewer is in heartiest accord.

Much to our surprise x-ray is advocated for the sexual hyperesthesia of nymphomania. In our experience this aberration has largely proved psychical and uninfluenced by ablation or atrophy of the ovaries. Intrauterine irrigation for acute endometritis is not in accord with modern teaching. The operation for cystocele, as described and illustrated is not satisfactory. We are sorry to see the curve of v. Ott, long since discredited, crop up again.

The reviewer knows of no text book which is so equally suitable for the student and for the practitioner, as Crossen's. Simplicity combined with thoroughness and consistent method are responsible for this flexibility. In spite of its encyclopedic contents the book contains only 1005 pages.

ROBERT T. FRANK.

The Healthy Child from Two to Seven, a Handbook for Parents, Nurses and Workers for Child Welfare Containing the Fundamental Principles of Nutrition and Physical Care, including Sections on Child Nature, Training and Education and Safeguarding the Nervous System during Preschool Years. By FRANCIS HAMILTON MacCARTHY. M.D. 234 pages. The MacMillan Co., New York, 1922. Price $1.50.

The lengthy title sufficiently covers the contents of this little guide which is pleasantly written. Some parents may consider the text a bit too vague to be readily applied to practical problems. In the homely parlance of the day more "pep" would add to the value of this book, and perhaps enable it to compete with some of the popular children's guides which are presented to expectant mothers when they purchase three dozen or more diapers from some of our department stores.

R. T. FRANK.

Le Problème du Cancer. By WILLIAM SEAMAN BAINBRIDGE, A.M., Sc.D., C.M., L.L.D. Traduit de l'anglais par le Dr. Hertoghe d'Anvers. Louvain et Paris, A. Uystpruyst and O. Doin, 1922.

The interest, to the American reader, in this book is mainly sentimental, as it is a translation of the English edition published by the MacMillan Co., but is the first book to appear from the reconstructed press of the University of Louvain. The translation is fluent, the typography good, but the paper is poor.

ROBERT T. FRANK.

A Manual of Obstetrical Nursing, prepared for use in connection with Text Books of Obstetrics. By NANCY E. CADMUS, R.N. 100 pages. G. P. Putnam Sons, New York and London, 1922. Price $1.50.

This is a skeleton outline to be used for instruction of nurses. It contains five parts—class work, lectures, quizzes, practical demonstrations in obstetrical nursing and maternity nurse visiting.

R. T. FRANK.

Original Communications

EFFECTS OF IRRADIATION ON FETAL DEVELOPMENT*

BY HAROLD BAILEY, M.D., AND HALSEY J. BAGG, PH.D., NEW YORK

I N THE last five years radium has become available in certain amounts to many individual operators. At present there is hardly a community of any size that has not at least the equivalent of 100 mgs. of the metal. The dissemination of this active physical agent has resulted in its employment in clinical gynecological conditions as an adjunct to or in place of surgery, by many physicians who have little knowledge of the physiologic and biologic principles involved.

There have been so may loose statements concerning the cure, by irradiation, of gynecologic conditions, during all periods of sexual life, with the intimation that no serious results follow in the treatment of these conditions, that we deem it a proper time to present some clinical and experimental facts relating to this subject, especially in regard to the reaction of the ovary and the developing fetus.

In the treatment by irradiation of fibroids and myopathic hemorrhage there is still a difference of opinion as to whether the action centers mainly in the ovaries or the uterus. Many operators believe that in the treatment of fibroids the radium rays affect mainly the growth itself rather than the ovary; while in the treatment of hemorrhage, menstruation is checked by inhibiting ovulation. Notwithstanding these different views the source of irradiation is usually placed in the same place during treatment, that is, the body of the uterus. This question is so well debated that there are now two schools of thought, as Beclere[1] has recently pointed out. The Germans believe the radiation effect is mainly on the ovaries, while the French believe it is upon the uterus.

---

*Read at a meeting of the Section on Obstetrics and Gynecology at the Academy of Medicine, February 27, 1923.

This is really a serious matter because of the differences in treatment that might ensue. The uterus is many times invaded and an operation of more or less magnitude is performed, where the result might be accomplished by external irradiation.

Granted that some form of irradiation is indicated in these pathologic conditions certain questions are immediately raised: Is the effect upon menstruation permanent- in women irradiated during sexual life? If not, do the follicles ever regain perfect development with full capacity of forming a normal fetus?

There is another problem in this field which, in the light of recent experimental work upon animals, needs consideration. This concerns the effect upon the developing child of irradiating the fetus *in utero*. Even when the fetus is born at term and apparently of normal weight and size, do we know whether its postnatal development will be normal? The great practical importance of these questions is evident, for a review of the experimental work on the lower animals has shown that if the irradiation occurs very early in pregnancy the fetus may be so injured that it dies and is aborted, or its development may be only slightly arrested, and yet while it may be born alive, it may show great abnormalities. On the other hand, if the radiation be given late in pregnancy, the results may be of such an insidious nature, even possibly endocrine in origin, that a normally appearing offspring at birth may be stunted and show disturbances of metabolism later in life.

The results of the experimental studies in this field are conclusive in agreement that detrimental disturbances occur in animals that are exposed to a sufficient amount of irradiation during the various stages of development. This is probably due to an arrest in the orderly sequence of embryonic processes, and the type of resulting monster is apparently determined by the developmental period at which the exposure is given. Abnormal structural changes following arrested development are not at all limited to the effect of irradiation. Stockard's experimental work on the production of twins, double monsters, etc., has shown that many physical and chemical agents may bring about such changes.

DISTURBANCES IN ANIMAL DEVELOPMENT PRODUCED BY RADIUM IRRADIATION

The brief report of the following studies deals with abnormalities produced in animal development by exposure to radium rays during the various stages of growth. Bohn[2] in 1903 was among the first to report maldevelopment in the sea-urchin following exposure of the eggs to radium rays, and similar reactions were noted by Perthes[3] for the treated ova of ascaris. Studies on amphibians have been

conducted by several investigators, but the work of P. Hertwig,[4] O. Hertwig[5] and G. Hertwig[6] are classics in this field. Their investigations confirmed the idea that retardation of embryonic development was a sequel to irradiation. Normal fertilized ova when irradiated produced deformed larvæ, and the degree of destructive changes varied with the amount of radium used and the duration of the exposure. Interesting results were noted when normal eggs were fertilized by irradiated spermatozoa. Heavily irradiated spermatozoa produced apparently normal young, for in this case the paternal elements merely initiated what might be called a parthenogenetic development, and were too extremely injured to combine their chromatic material with that of the maternal nucleus, while slightly irradiated spermatozoa produced variously deformed young. Schaper[7] found similar changes occurring in other amphibians treated with radium rays and Tur[8] reported the presence of deformities in the embryos of birds irradiated through the shell of the eggs. Bagg[9] has recently reported disturbances in development produced by radium emanation, and in these experiments amounts of radium emanation were used equivalent to one and one-half grams of radium metal. Clinical applicators were employed and two millimeters of lead and one-half millimeter of silver filtration ensured mainly a gamma-ray type of radiation. Pregnant rats when irradiated near the end of pregnancy produced offspring that either died about ten days after treatment, or if living after this period, the young showed markedly deformed brains with practically no cerebral cortex, and in addition, the animals were blind and sterile in both sexes. Solutions of the active deposit of radium emanation were also used intravenously or subcutaneously in pregnant animals (the usual dose was 5 millicuries), and either produced death and absorption, or abortion of the young, or characteristic subcutaneous areas of extravasation in the developing embryo. Similar cutaneous lesions were also noted in three different litters where the mothers were treated several days before mating with untreated normal males.

DISTURBANCES IN ANIMAL DEVELOPMENT PRODUCED BY X-RAY IRRADIATION

The results of the biologic effects of x-ray exposure on animal development closely parallels those of the radium experiments. Perthes[10] noted monstrosities in the embryos of ascaris exposed to x-rays. Bordier[11] produced abnormalities in silk worms when treated in the same manner, and Hastings, Beckton and Wedd,[12] working with the same species, noted a progressive loss of fertility in the insects, which was especially marked in the immediate descendants of the treated individuals. Mavor,[13] who has recently reported experiments on the

x-ray effects on the fruit fly, Drosophila, has apparently shown that x-rays may produce a specific modification of the hereditary mechananism which is inherited as such. He found that a considerable number of exceptional daughters were obtained by submitting the mothers to x-rays before mating. A large proportion of these exceptional daughters has been found to be fertile and have bred further exceptions without having been submitted to x-ray. The work of Gilman and Baetjer[14] with amphibians showed that when the ova of Amblystoma were exposed to x-rays there was an apparent acceleration in development for a short time, yet the resulting offspring were abnormal. Baldwin,[15] also working with frog larvæ, has recently reported the production of monsters conforming to a definite type by means of x-ray irradiation. Hippel and Pagenstecher[16] treated pregnant dogs with x-rays (twenty-one Holzknecht units were used) and produced either cataracts in the eyes of the young or death and abortion of the embryos. Regaud, Nogier and Lacassagne[17] noted that x-ray exposure led to abortion in dogs. Cohn,[18] Lengfellner,[19] Krukenberg,[20] and also Walter[21] report deleterious effects in animals exposed to x-rays before birth (irradiation of mother), or soon after birth. Hansen[22] has recently x-rayed pregnant rats and reported results very similar to those obtained by Bagg with radium. Sterility, eye defects, and deformed skulls were noted in the offspring of irradiated animals. Little and Bagg[23] have again reported disturbances in the offspring of mice irradiated with x-rays. Deformities of the legs, feet, head and eyes were especially noted. Their most interesting result consisted of a pronounced eye deformity, which apparently behaves in its inheritance as a Mendelizing character, and is recessive to normal. This abnormal character has been studied through seven generations of animals, and over three hundred abnormal animals were noted. Its inheritance has been tested not only by matings within the x-rayed lines, but by an outcross, and by its transmission through the males only.

During the writing of this paper we have received a reprint of experiments recently published in France by Lacassagne and Contard,[24] concerning the irradiation of rabbits with x-rays* and the attending disturbances in the physiologic activity of the ovary, as well as marked disturbances in the later-developing fetus. When pregnant rabbits were irradiated at nearly full term with x-rays, the young treated *in utero* died at, or a short time after birth, showing pathologic reactions typical of those already described by other investigators. The experiments were mainly concerned, however, with

*The entire abdominal region was treated. Target-skin distance .25 to 32 cm.; 6 mm. of aluminum filter; 2.2 to 3.5 milliamperes; spark-gap 25 cm. The time of exposure varied from 30 to 90 minutes.

the later sexual activity of the females that had lost their first litters. When they were mated with normal males the following results were noted:

1. Temporary sterility extending over three to four months.

2. Re-established fertility, but associated with a reduction in the number of viable young of the successive litters, frequently alternating with an apparently normal oestrus, acceptance of the male, but without fertilization being established.

3. Progressive premature sterility.

4. In certain cases the uterus was ruptured during pregnancy, and other pathologic conditions were observed that had never been seen in the control stock.

5. There were relatively few young born from irradiated females, but some of these were apparently normal, and when mated with normal males produced apparently normal offspring. However, in this group other offspring of irradiated females, although apparently normal at birth from external appearance (and later from microscopical examination, also normal), showed marked metabolic disturbances at the time of weaning, when changing from one type of food to another, and died in all cases after a few days of persistent diarrhea, which was a characteristic symptom.

CLINICAL STUDIES SHOWING THE EFFECTS OF X-RAY AND RADIUM IRRADIATION ON HUMAN DEVELOPMENT

There are several reports by clinicians indicating that irradiation is not harmful to fetal development, but for the most part these articles deal with few cases and generally the authors are careful to qualify their statements.

Corscaden treated three women for fibroids or menorrhagia, and in a private communication to us gives the details of two cases where pregnancy followed. One woman, twenty-five years of age, was treated for bleeding, and was given an x-ray treatment equal to two-thirds of a standard sterilizing dose for a woman near the menopause period. Menstruation became more or less normal. Three years later she became pregnant and gave birth to a normal child, which to date (three years) is apparently physically normal. The second woman was thirty-eight years of age and was treated for a fibromyoma, eight cm. in diameter. Fifty mg. of radium bromide were placed in the uterus for twenty-four hours. Three or four menstrual periods were missed before pregnancy was noted. When the gestation had advanced to the sixth month, miscarriage occurred, the patient giving the history of a fall. The fetus was macerated but apparently well formed. In a recent article Corscaden[25] concludes that normal pregnancy is possible after temporary menopause.

Steiger[26] in 1921 had a patient, thirty-nine years of age, with a fibroid uterus and exophthalmic goiter. Following the irradiation of both thyroid and uterine growths with x-ray the patient had amenorrhea. Two years later she became pregnant and was delivered at term of a well-formed, strong child. The author concludes that, despite radiation of the ovaries, a woman may become pregnant and have a normal child.

Field[27] describes a case of pregnancy complicated by cancer of the uterus, which he treated by irradiation. The treatment began when the fetus was in the sixth month and large doses of radium were employed during this period, making a total of 7,320 mg. hours. Seven weeks after the first dose premature labor occurred, with the delivery of a four pound infant which was normal and remained so, but was followed only to the age of three years.

Polak[28] in 1922, in "Notes on the Clinical Value of Radium in the Management of Uterine Hemorrhages," found that the average dose was 400 mg. hours in the 31 cases that he treated. Six of these women are now married and two have become pregnant, and he states that it is a "fact which answers some of the criticisms which are made of using radium in young girls."

Schmitz in discussing Maury's paper[29] on the "Results of the Exposure of Animal Ovaries to the Rays of Radium," states that he had two patients whom he treated for uterine bleeding, and who later became pregnant and delivered infants which were perfectly normal.

Horner[30] in an article on "Roentgenography in Obstetrics," states that in the use of x-ray for the purpose of determining the pelvic measurements during pregnancy there is no single instance of maldevelopment either physical or mental occurring in his series. He states that thousands of women have been subjected to x-rays during the early months of pregnancy without effect on the ovum. However, he amplifies the statement by saying, "I do not mean to imply that the x-ray cannot kill an ovum, but refer to the use of the apparatus for diagnosis. The modern abortionist uses it to kill." In regard to the amount of x-ray exposure that may be used on a pregnant woman, he describes a case of his own where a total of twelve exposures amounted to 3,000 milliampere seconds.

J. G. Clark and F. B. Block[31] state, in April, 1922, in a paper on "Radiotherapy of Non-malignant Menorrhagia," that excessive menstruation may be regulated with a fair degree of certainty, and they do not hesitate to use irradiation in urgent cases even in pubescent girls. They further state "moderate exposure may kill only the older and riper follicles that are near the surface (of the ovary), while the younger and less developed bodies escape its influence."

The following clinical reports record harm to the fetus following

irradiation or, at least, indicate the need of caution in treating before or during gestation.

In August, 1922, J. G. Clark and F. E. Keene[32] analyzed 527 cases of myoma uteri and myopathic lesions, and state that in adolescent girls one should be most wary in using radium because in sufficient dosage it will just as surely stop menstruation for all time as will double oophorectomy. They show a preference for operation rather than radium in the treatment of young women with fibroids. In regard to pregnancy following irradiation, their experience consisted in the treatment of five women. The authors state that the application of radium gives but little forecast in favor of restoring the child-bearing possibilities. There were seven pregnancies in this group of women, three infants were born at term and four miscarriages or premature deliveries were noted, three occurring in one patient.

Archangelsky[33] reports the results from treating ten women suffering from tuberculosis where termination of pregnancy was necessary. They were given x-ray irradiation over six abdominal and two dorsal fields. The dose varied from eighteen to sixty-seven Holzknecht units. Both German and American tubes were used, and one mm. of aluminum filter and two mil. amp. of current. Three to seven treatments were given. Seven of the ten cases were treated when not more than two months pregnant, while three were slightly more advanced. All of the seven cases showed considerable bleeding, apparently as a result of the irradiation, there was complete abortion and three embryos were found after expulsion. Abortion did not occur in the three women with slightly older pregnancies (only one showed some slight bleeding after irradiation), surgical intervention was necessary and revealed in each instance a dead embryo. Histologic examination of each of these embryos showed destructive changes in the central nervous system. It is interesting to note that the dosage employed was not sufficiently strong to prevent the prompt return of menstruation in all the women, with one again becoming pregnant. The author concludes that x-ray irradiation should not be considered as ineffective in the treatment of pregnant women, and that he had especially demonstrated that deleterious effects on the fetus and abortion would result from irradiation during the first days and weeks of pregnancy.

Stacy[34] in the treatment with radium of 1013 cases of menorrhagia reported the occurrence of ten pregnancies following the treatment. Four normal infants were born and three were dead at birth. One woman had two miscarriages and another was pregnant at the time of the report. Stacy concludes that small doses of radium are indicated in a few selected case of menorrhagia of young women of the child-bearing age.

Berkley,[35] in reporting a case where cesarean radical hysterectomy followed the application of radium to the cervix in a pregnant woman, states that a child was born, which was apparently normal up to seven years and five months after birth. Two hundred and thirty-two mg. were placed in the cervix for eight hours during the sixth and seventh month of pregnancy, and cesarean section followed at nearly full term. The interesting observation in this case is that according to the author the baby at birth had two bald patches on its head corresponding to the position that the radium had occupied. These bald spots disappeared later on.

Stettner[36] reports a case of myoma accompanying pregnancy that was treated by roentgenotherapy. The child born at term showed deformed ears, eyes and genitals and also a general disturbance of co-ordination. At the age of two years this infant's mental functions were not normal. The symptoms at this time were those both of inflammatory origin and of developmental defects. The growth in height was sixteen months below normal and the ossification fourteen months behind.

Aschenheim[37] reports the case of a woman who was irradiated with x-rays for uterine myoma and the conception occurred between treatments. The delivery was premature at the eighth month of gestation and the child later became an imbecile. The boy had sunken and flat, nearly blind eyes. He had a microcephalic head and occasionally had convulsions. His hearing was normal.

One of the most interesting articles on this subject is by Werner.[38] In 1921 he reported the results of pregnancy in seventeen women out of 1500 whom he had treated with irradiation for menorrhagia and myoma. There were twenty-four pregnancies; of these, nine were abortions; fourteen children were born alive and of these fourteen, four died within the first year. Three children, when six to eight years old, were 16 per cent below the normal in weight and 8 per cent below normal in height. There were two cases that were treated during pregnancy. In one the child was normally developed at the time of delivery. In the second case the child was born at term and weighed only two kilograms. It was lacking in fat and its skin was a pale yellow. At the time of the report the child was three years old, but its height and weight correspond to that of a two year old child, but it is otherwise healthy. Werner concludes that radiation of the ovum or the embryo may cause injury which can be followed by extensive improvement in the course of later development.

DESCRIPTION OF OUR CASES

Pregnancy following irradiation, or irradiation of women already pregnant.

IRRADIATION DURING PREGNANCY

CASE 1.—K. A., No. 28108. Age twenty-three years. Admitted September 10, 1920, with diagnosis of glioma of the spinal cord. This patient had previously been irradiated for the purpose of x-ray examinations of the spine on the 20th and 23rd of August. On admission she was about three and one-half months pregnant. She was treated in the intrascapular regions with 75,706 millicurie hours of gamma-ray irradiation. She was admitted to the Manhattan Maternity Hospital and on February 11, 1921, the abdomen was opened without general anesthesia and the infant was removed. It was living and had a spina bifida and double club feet. The mother died ten days later and the infant was taken to another hospital where it died after fifteen days.

CASE 2.—M. A., No. 27329. Age thirty-five years. Admitted to the hospital when pregnancy was six and one-half months advanced, with an epidermoid cancer of the cervix. She was treated by the insertion of "bare tubes" of radium emanation and a platinum tube of radium on Feb. 16 for a total of 2356 millicurie hours. The following day she received 960 millicurie hours in the region of the cervix, in three directions, by means of the "bomb" applicator. She received also 297 millicurie hours in "bare tubes" placed in the cervix. Eclampsia developed and she was delivered by a cesarean section performed April 3, 1920. It was found that the breech was in the lower uterine segment. The baby had no apparent malformations. The woman died on April 16. The baby weighed 4½ pounds at birth and at the end of fifteen days was transferred to the Babies Hospital. It left there on May 15—forty-two days old and apparently normal, but it died of pneumonia at the age of two and one-half months.

CASE 3.—M. B., No. 27758. Age thirty-seven years. Epithelioma of the vulva. Patient was first seen June 12, 1920. She was then five months pregnant. She was treated with 1065 millicurie hours in "bare tubes" implanted in the tumor. On August 15, 396 millicurie hours of bare tubes were placed in either groin after gland dissection. On September 27 she received a treatment of 2,003 millicurie hours by the so-called "block" application against the vulval tumor. The patient was transferred to the Woman's Hospital for delivery, as she had been sent to us originally by that institution. A normal infant was born by cesarean section on October 25 and is now living and apparently normal. The mother died on February 6, 1921.

PREGNANCIES FOLLOWING IRRADIATION

CASE 1.*—B. L., No. 24298. Age twenty-five years. The patient was suffering with Hodgkin's disease and was treated by x-ray irradiation to the neck, groins, back and axilla during May and December, 1917. The woman became pregnant, and in September, 1918, she delivered a male infant which died eleven hours after birth. It had malformation of the head and the sagittal suture was open exposing the brain. The patient died two years later. Autopsy showed, among other pathologic conditions, atrophy and fibrosis of the breast and fibrous atrophy of the ovaries.

CASE 2.—G. W., No. 25167. Age thirty-one years. This patient was irradiated for a fibroid of the uterus. A silver wire applicator was placed in the uterus for a treatment of 420 millicurie hours, and an external application of gamma-ray irradiation was made over the uterus, at 4 cm. distance, for a total of 3005 millicurie hours. One and one-half years later she was delivered of a large,

stillborn infant, weighing nine pounds and two ounces but there is no accurate information as to the cause of death.

CASE 3.—J. R., No. 28743. Age twenty-eight years. This patient had a fibroid uterus about the size of an orange. She had a normal child three years of age. On February 2. 1921, she was treated with radium emanation in a platinum tube, with a half millimeter of filtration, for a total of 1,000 millicurie hours. It was expected that this treatment would cause permanent sterility, but although the menstrual flow was diminished it was never entirely stopped, and in November, 1921, the patient became pregnant. On the eighth of the following August a baby was born, apparently normal, and weighing seven pounds and one ounce.

DISCUSSION AND SUMMARY OF RESULTS

We have attempted in this paper to bring together the experimental and clinical studies relating to the effects of radium and x-ray irradiation upon the functional activity of the ovary and the reaction upon the developing fetus, when irradiation is given before or during the various stages of pregnancy.

As previously stated in detail, the experimental data upon the lower animals have shown that when the sex glands are sufficiently irradiated *before* fertilization the following are typical fetal reactions:

1. Disturbed, abnormal, arrested development, resulting in the formation of monsters conforming more or less to a general type, and pronounced disturbances in the development of the central nervous system (Bohn, Perthes, O. and G. Hertwig, Schaper, Tur, Bordier and Baldwin).

2. A marked tendency to a progressive loss of fertility.

3. A specific modification of the hereditary mechanism (Mavor) and the production of inherited defects in the young, especially in the eyes (Little and Bagg).

Irradiation during pregnancy produces the following typical disturbances in fetal development, depending upon the developmental period at which the irradiation is instituted:

1. Disturbed, arrested, abnormal development with death of the embryos, absorption or abortion, stunting in growth, cataract, sterility, lesions of the central nervous system and blood vascular disturbances in the embryos. (Hippel and Pagenstecher. Regaud, Nogier, and Lacassagne, Lengfellner, Krukenberg, Cohn, Walter, Bagg, Hansen, and Lacassagne and Coutard.)

When we come to a discussion of the clinical reports it must be borne in mind that the data cannot be presented with the same scientific evaluation that may be given to experimental biologic studies, and although we realize that one cannot directly transfer the experimental results from animal to man, yet we believe that there is no reason for considering human developmental processes as essentially different from those of other mammals. and it has been our aim to bring together the clinical reports to interpret and correlate them as

much as possible, and to add our six cases. We are fully aware that developmental disturbances are to be found in many instances of human ontogeny where irradiation has never been applied and we wish to caution those who contemplate the irradiation of women during the child-bearing period with a view to preserving the procreative ability.

In judging the clinical reports we believe that in those instances where comparatively great disturbances have resulted in the child, the irradiation was given early in pregnancy. Here we would place the children with subnormal mentality and other defects reported by Aschenheim and Stettner.

We believe that irradiation during early pregnancy may produce death and abortions of the fetus, and we would place in this group the four abortions reported by Clark and Keene, two by Stacy and nine by Werner.

Irradiation during late pregnancy is not so likely to produce gross developmental abnormalities in the child at birth, but the clinical data seem to agree with the experimental in several instances where children irradiated *in utero* at this period have been prematurely delivered, or have shown postnatal growth disturbances, or death within the first year. Werner reported three such retarded children, and four that died during the first year. The second child we reported was born of a mother who was irradiated very thoroughly late in pregnancy, was apparently normal at birth, but died when ten weeks old.

The severity of the treatment, as well as the period in development when the irradiation was given, no doubt determines the reaction of the fetal tissues. Our third case was treated during the fifth month of pregnancy, and then only locally, an effect largely due to beta-ray radiation within the vulval tumor. At the eighth month the mother was treated over the vulva with gamma-ray radiation which was equivalent to 50 per cent of the skin dose. The treatment was not severe, the fetus was not directly irradiated, and the child was apparently normal at birth and has remained so to the present time.

The second division of this study relates to the irradiation of women before conception where complete sterility is not produced. The experimental evidence in the lower animals shows with great probability that irradiation injures the follicular elements of the ovary. The first patient we reported was suffering from Hodgkin's disease and ten months before conception was heavily radiated with x-rays. A male infant was born with an extensive developmental arrest in the formation of the head and died after a few hours. The second patient was irradiated for a fibroid with gamma-ray radiation both from within and outside the uterus, and she became pregnant eight-

een months later. In this instance a large, stillborn infant was born at term. Our last case was also irradiated with a gamma-ray radiation from a platinum tube placed in the uterus. Conception occurred seven months later, and the child was apparently normal at birth. Our own evidence is not sufficient to warrant our attributing the developmental defect in the first case, or the stillbirth in the second as due to irradiation.

Archangelsky irradiated with x-rays ten women suffering from tuberculosis with the intent of producing abortion and was successful in seven instances. This evidence is apparently conclusive that irradiation during early pregnancy may produce death and abortion of the fetus. The abortions reported by other clinicians and mentioned above, can hardly be considered as additional evidence because we do not know in these cases the condition of the uterine wall or other pathologic conditions.

CONCLUSIONS

1. It is questionable whether radium or x-ray irradiation should be used to destroy the ripe follicles, leaving the immature ones injured but capable of development. This statement is made entirely on the strength of the experimental work on the lower animals and we do not feel justified in considering any of the available clinical records as adding conclusive evidence in this regard. In the treatment of menorrhagia in the child-bearing period we believe that complete sterility is preferable to the possibility of a damaged germ plasm.

2. Irradiation of the ovum during early pregnancy should never be permitted. Radiation in late pregnancy, while it may not produce gross abnormalities at birth, may hinder the growth and development of the child in later life.

BIBLIOGRAPHY

(1) *Beclere, M.:* Am. Jour. Roent., 1922, ix, No. 12, p. 797.   (2) *Bohn, B.:* Compt. rend. Soc. de biol., 1903, xl, 1442. (3) *Perthes, G.:* Deutsch. Med. Wchnschr., 1904, xxx, 632.   (4) *Hertwig, P.:* Arch. f. mikr. Anat., 1911, lxxvii, No. 2, p. 301.   (5) *Hertwig, O.:* Arch. f. mikr. Anat., 1911, lxxvii, No. 2, p. 1.   (6) *Hertwig, G.:* Arch. f. mikr. Anat., 1911, lxxvii, No. 2, p. 165.   (7) *Schaper, A.:* Deutsch. Med. Wchnschr., 1904, xxx, 1434.   (8) *Tur, J.:* Compt. rend. Soc. de biol., 1911, lxx, 679.   (9) *Bagg, H. J.:* Am. Jour. of Anat., 1922, xxx, No. 1, p. 133.   (10) *Perthes, G.:* Deutsch., Med. Wchnschr., 1904, xxx.   (11) *Bordier:* Le Radium, 1905, ii, 410.   (12) *Hastings, Beckston and Wedd:* Archiv. Middlesex Hospital, eleventh cancer report, 1912.   (13) *Mavor, J. W.:* Anat. Rec., 1923, xxiv, 415, also 1922, xxiii, 99.   (14) *Gilman and Baetjer:* Am. Jour. Physiol., 1904, x, 222.   (15) *Baldwin, W. M.:* Anat. Rec., 1919, xvii, No. 3, p. 135.   (16) *Hippel and Pagenstecher:* München Med. Wchnschr., 1907, liv, 452 and 1385.   (17) *Regaud, Nogier, and Lacassagne:* Arch. D'elect. Med., 1912, xxi, 321.   (18) *Cohn:* Verhandl. d. deutsch., Ront. Gesellsch., v, 70.   (19) *Lengfellner:* München med. Wchnschr., 1906, xliv, 2147.   (20) *Krukerberg:* Verhandl. d. deutsch. Rönt Gesellsch., 1909, v, 70.   (21) *Walter:* Fortschr. a. d. Geb. der Rönt., 1912, xix, 123.   (22) *Hansen, F. B.:* Anat. Rec., 1923, xxiv, 415.   (23) *Little and Bagg:* Anat. Rec., 1923, xxiv, 413.   (24) *Lacassagne and Coutard:* Gynecol. et Obstet., 1923, vii, 1.   (25)

Corscaden, J. A.: Am. Jour. of Roent., 1922, ix, No. 12, p. 812. (26) *Steiger:* Schweiz. med. Wchnschr., 1921. (27) *Field, C. E.:* Am. Jour. of Roent., 1922, ix, 657. (28) *Polak, J. O.:* Med. Record, 1922, ci, No. 12, 493. (29)*Maury, J. M.:* Jour. Am. Med. Assn., 1920, lxxiv, 1711. (30) *Horner, D. A.:* Surg. Gynec. and Obstet, 1922, xxxv, No. 1, 67. (3) *Clark, J. G. and Black, F. B.:* Am. Jour. of Med. Sci., 1922, p. 614. (31) *Clark, J. G. and Keene, F. E.:* Jour. Am. Med. Assn., 1922, lxxix, No. 7, p. 546. (33) *Archangelsky, B. A.:* Arch. für Gynäk., 1923, cxviii, 1. (34) *Stacy, L. J.:* Am. Jour. of Roent., 1922, ix, 658. (35) *Berkley:* Jour. of Obstet. and Gynec. of the Brit. Empire, 1922, xxviii, 538. (36) *Stettner, E:* Jahrbuch für Kinderh., 1921, xcv, 43. (37) *Aschenheim, E.:* Arch. für Kinderh., 1920, lxviii, 131. (38) *Werner:* München. Med. Wchnschr., 1921.

MEMORIAL HOSPITAL, NEW YORK.

THE EVOLUTION OF THE OPERATION FOR MYOMA OF THE UTERUS*

A STUDY BASED ON OVER TWO THOUSAND LAPAROTOMIES

BY PROFESSOR DR. D. VON OTT, PETROGRAD, RUSSIA

THE radical treatment of the uterine myoma represents one of the most complex problems in the history of gynecology. Not until recently, in spite of the efforts of the best workers in the field, has it found its satisfactory solution. Suggestions for newer operations and for various forms of conservative and medicinal treatment have followed each other in quick succession (Ssnegireff, Battey, Hildebrandt, etc.), proving only the dissatisfaction experienced in practice with each of them. In large collective statistics S. Pozzi still demonstrated an average mortality of 64.7 per cent for operations performed by various surgeons. An expert like Spencer Wells had an operative mortality of 52 per cent, Billroth, the great surgeon, of 60 per cent, and K. Schroeder the gynecologist, even of 85 per cent. In Russia conditions were not different. Rein, in 1875, calculated the operative loss at 75 per cent. This deplorable situation aroused my interest in the first years of active practice, especially because similar operations, such as ovariotomy, even at that time could boast of decidedly better results. I planned to find the causes for this lamentable difference, and set out to visit all the famous clinics, to acquaint myself personally with the operative and nonoperative methods of myoma treatment as practiced by the best gynecologists and surgeons of the day. Men like Pean in Paris, Spencer Wells, Bantock, or Tornton in London, Koeberle in Strassburg, Schroeder in Berlin, Billroth in Vienna, and many others not only gave me free access to their clinics, but were ever ready to discuss freely the questions offering themselves

---

*Translated by Dr. Hugo Ehrenfest.

at the operating table or in the ward rounds. After three years, returning to Russia, I was convinced that the poor results of myoma operations were not due to any single factor, but were the product of a number of circumstances, very important among them the problem of a satisfactory antiseptic sterilization of the genital tract before operation. It became essential, outside of the mere technical side of the operative procedures, to study exactly and from every angle every factor that enters into the problem of radical therapy for uterine myoma.

Investigating blood pressure in this connection I discovered its relation to menstruation and the law of the cyclic changes of all physiological function of the female.[1] The highest level of blood pressure does not coincide with menstruation but occurs a few days earlier and then drops suddenly with the beginning of the flow. This knowledge, in accord with the special features of the individual case, now permits the operator to select the most favorable moment for operation. Personally, if I have the choice, I prefer to operate just before, or at the beginning of, menstruation. In the case of the very anemic patient thus at least one more loss of blood is prevented. I am thoroughly convinced that this procedure has saved the life of more than one of my patients. I feel fully justified in objecting to the common view, that one should not operate during menstruation, because in not one of the many operations performed by me at that time I was ever able to discover a complication directly referable to the concomitant menstruation. I might cite here an extremely anemic patient showing hemoglobin of but 10 per cent when coming under my care after having received two ineffective treatments with x-rays. Two or three weeks later, when I operated on her, at the onset of menstruation, hemoglobin had risen to 20 per cent. Recovery from operation was entirely uneventful.

In the histopathologic study of fibromyomas I found opportunity not only to confirm certain known changes in these tumors, but also to describe, as the first, the formation of infarcts.[2] This particular case led me to the discovery of the cause of all degenerative processes so commonly occurring in fibromatous tumors. In my Operative Gynecology (pp. 369 and 370) I show illustrations of some very rare types of myomas. Speaking of the pathologic anatomy I might refer to myomas which develop behind the cervix. Originating from the supravaginal portion of the cervix they actually lie extraperitoneally. Up to now they have been considered inoperable by various surgeons on account of the danger of hemorrhage and in view of extreme technical difficulties experienced in their removal. As a rule they protrude with a large segment into the posterior vaginal fornix. Personal experience forces me to deny the inoperability of retro-

cervical myomas.   By the vaginal route the removal, indeed, is not
only void of all difficulties but simple from the standpoint of technic.
By means of a transverse incision through the posterior fornix access
is gained directly to the tumor.   If comparatively small it can be
simply enucleated, if too large it is removed in portions by morcelle-
ment.[3]   In the latter procedure the lowest end of the tumor is well
exposed by means of retractors and then a cone-shaped piece excised,
followed by the excision of similar portions, the edges of the vaginal
walls being held apart with volsella, until the mass is small enough
to be peeled out completely.   The cavity is then packed loosely with
gauze.   If at all possible, the resulting cavity should be inspected
by means of my lighted specula[4] so that perfect hemostasis is made
certain.   As a rule, however, in this operation the hemorrhage is in-
significant.   The operation can be designated a conservative one,
since the peritoneum remains intact, and being entirely extraperi-
toneal the operation hardly represents any risk to the patient.

I remember a case seen in consultation, a far advanced pregnancy.
The very experienced colleague considered a spontaneous labor as
impossible and a cesarean section clearly indicated.   A retrocervical,
extraperitoneal myoma occupied the larger part of the pelvic cavity.
I proposed the operation, described above.   After some persuasion
this physician performed it, successfully and easily, as he reported
to me some time later.   Three or four weeks later the patient gave
spontaneous birth to a full-term child of normal development.

However, not only the retrocervical myomas are regarded inoper-
able, but it seems that many also hesitate to attack an intraliga-
mentous growth.   Also in this respect I disagree.   In my experience
myomas in this position are particularly favorable for enucleation,
because the surrounding connective tissue as a rule is very loose.
Just in this respect the difference between ovarian cysts and myomas
deserves special emphasis.   While the former often are complicated
by inflammatory reactions in adjoining organs (pseudointraligamen-
tous cysts!) the latter commonly lie within normal connective tissue.
It is easier to peel out a firm mass (by pushing the peritoneal cover-
ing out of the way with a gauze sponge) than to free the fragile sac of
a ruptured cyst from firm peritoneal adhesions.

Turning from the pathology to certain clinical aspects of the con-
ditions under discussion, I shall begin with the loss of blood.   It is
of greatest significance, because as the effect of repeated profuse
hemorrhages, myoma patients at the time of operation prove particu-
larly sensitive to any further loss of blood.   It must be reduced to the
possible minimum during operation.   In this respect worthy of serious
consideration is a suggestion made by Kleberg of Odessa.   He secures
prophylactic hemostasis and thus works in an almost bloodless field

by tying rubber tubing snugly around the pedicle of the tumor or, in case of a supravaginal amputation, around the uterus itself. How- ever, there is a definite shortcoming to this method since it is difficult to maintain the tubing in proper position during the entire operation. Also the instrument, designed by Pozzi to serve the purpose, is un- satisfactory because the locking device will open at slight pressure. In my clinic we employ an appliance I have designed[5] with which either pedicle or the entire uterus can be clamped, and which can be tightened or loosened at will. The introduction of such prophy- lactic hemostasis I consider a great step forward in the development of a safer myomectomy or supravaginal hysteromyomectomy. This latter operation just at that time had been introduced and had gained great popularity especially in the modification suggested by Schroeder and Hofmeier. At the same time a lively polemic went on between Hegar and Schroeder, the former favoring the extraperitoneal, the latter the intraperitoneal burying of the stump. Seeing the advan- tage of Schroeder's intraperitoneal method, I used it in a series of cases.[6] Though the method of choice with most surgeons up to recent times, it has its disadvantages, inherent to all abdominal laparotomies, in causing hernias in the linea alba, suppuration of the incision, etc. In one of the last reports published by Schroeder he still complained of having seen hernias in 30 per cent of his laparotomies. Fully realizing the seriousness of this situation especially in view of the fact that patients would die simply as the result of the abdominal wound suppuration, I began to search for relief. I then proposed a new method of closure of the abdominal incision, consisting in sep- arate suturing of muscle and fascia by means of buried sutures.[7] Introduction of this muscle and fascia sutures quickly brought the desired improvement. There were no more hernias, nothing to say of the opening up of the entire incision, in the last ten or fifteen years. The great advantage of this method of abdominal closure after myoma operations by now has become generally recognized. There was still work to be done to eliminate a few of the all too common sequelae of the Schroeder-Hofmeier operation: high imme- diate mortality, long duration of convalescence, elimination of buried stitches by protracted suppuration especially after supravaginal hys- terectomy, etc. I proposed to remove the uterus in a simpler manner, more like an ovarian tumor is excised.[8] The new operation fulfilled all expectations. The minimum of a 20 per cent mortality of that day was immediately reduced to 4:3 per cent.

While assiduously working on further perfections of the operative technic, a case came under my hands, which actually determined the direction of all my future endeavors in this respect. I found a patient in the clinic, suffering from a gangrenous fibroid. There was pro-

fuse ill-smelling discharge. She had chills with temperature rising to 40° C. It seemed evident that the life of this patient was dependent upon the immediate removal, not only of the gangrenous tumor, but also of all adjoining infected or irritated tissues. Seeing no other way out of the situation, I determined to attempt a panhysterectomy. Just at that time (1891) Bardeleben had suggested such an operation (described by E. Martin). The details of the operation had not yet been worked out. I anticipated great technical difficulties for such an enormous undertaking as removal of the entire uterus together with a necrotic, suppurating fibroid. I became pleasantly disappointed. The operation was accomplished with astonishing ease and the patient recovered quickly.[9] Since there seemed no advantage in leaving the cervix behind, and since such a radical operation eliminated various disadvantages of the supravaginal operation (suppuration of stumps, exudates, abscess formation, etc.), I decided to give up the supravaginal amputation and make the panhysterectomy the operation of my choice. Its superiority seemed evident: perfect drainage of all secretions through the opened vagina, and no possibility of a recurrence in the preserved cervix which did necessitate in some cases a second operation. This latter advantage was particularly obvious for cases of associated malignancy, in which the cervix is the seat of predilection. For them this radicalism certainly was the appropriate mode of attack.[10] Therefore, I am now resorting to panhysterectomy except in those cases where a conservative myomectomy can be performed.

Greatly improved also were the operative results by a more general application of the vaginal methods of interference. Vaginal operations were cultivated and developed in my clinic. At the Fifth International Congress of Gynecologists (1910) quite a number of my former pupils, by now occupying chairs in other universities, offered contributions to the topic under discussion: Vaginal Methods of Operation in Gynecology and Obstetrics. (Werhoff, Kiparsky, Karobkoff, Markovsky, Preobraschensky, Ssizinsky, Ssoboleff, Jakobson, v.Ott). Vaginal hysterectomy, first proposed by Pean in France, for a long time remained unnoticed until our clinic devoted to it much thought and study. This incidentally led to the development of methods of direct illumination of the abdominal cavity, of uterus, bladder and rectum. I went so far as recommending the removal even of the appendix through the vagina and have successfully performed this operation in a number of instances. By means of my method of illuminating the peritoneal cavity any argument against "operating in the dark" is eliminated. Indeed, after each operation and after removal of the mass, with this instrument every corner of the field of operation is carefully inspected and the possibility of

defective hemostasis precluded. The smaller the tumor, the easier becomes its removal through the vagina. But even in the case of a large mass the vaginal route is not contraindicated as long as the uterus or fibroid can be pulled down well towards the pelvic outlet. Thus I succeeded once to remove through the vagina a tumor weighing 8000 grams. Of course, in such cases the growth is removed piece by piece by means of morcellation.

Results with the vaginal operations are approximately ten times better than those of the abdominal route. The general postoperative mortality was lowered to a remarkable degree and it was no longer a curiosity to see a series of 100 or more operations without a single death. From 1908 to 1912 I had in a series of 372 operations only

2000 OPERATIONS FOR UTERINE MYOMA
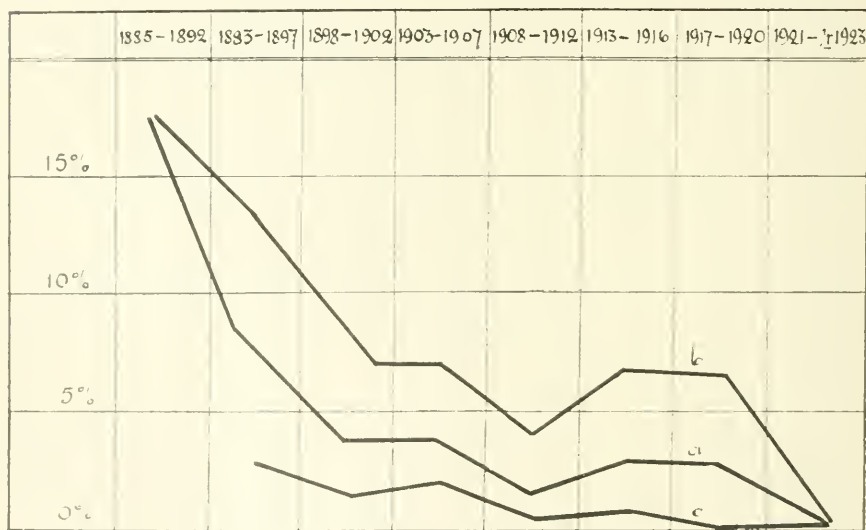
Fig. 1.

a—General mortality.
b—Mortality of abdominal operation.
c—Mortality of vaginal operation.

one death, a mortality of 0.27 per cent. From no other source have so far similar results been recorded. The transition from the supravaginal amputation to the abdominal panhysterectomy yielded an improvement in results, but the real benefit was derived from the development of vaginal methods so that they became applicable for myoma operations.

But these favorable results were not solely due to the advanced operative technic; in part at least, also to better information concerning the bacterial flora of the genital tract. Preoperative antisepsis was based on better theory and better practice. A critical study of all the problems involved in the proper preparation of the patient for operation resulted in obtaining a field of operation practically

free of germs.[11] One can almost assert that such preparation will eliminate the postoperative complications, heretofore dreaded by all surgeons. I wish to deny emphatically the view, so commonly expressed, that not so perfect a degree of antisepsis can be obtained in vaginal operations as in laparotomies. The contrary is true and this fact in itself has contributed to the better results with the vaginal operations.[12]

Thus, I trust, I have shown how scientific study and attention to details, outside of development of operative technic, have given us perfect mastery over the appalling mortality of former days, reducing it almost to zero. The views, I am expressing here, are based on a material of far over two thousand cases but I am employing for the diagram and table only the cases of the Clinical Institute for Physicians and of the Governmental Obstetric-Gynecological Institute where I at present am doing my work. The material of the year 1922 has not yet been fully analyzed but it includes a few dozen myomectomies without a death. I furthermore exclude the cases recorded in the Festschrift for Professor Sslavjansky and those I operated in the department of Professor Pelechin or in the Alexandria Stift of the Red Cross. This leaves a total of 1934 operations. Their distribution in the years between 1885 and 1922 is shown in Table I and Fig. 1.

This enormous material, larger than any ever before compiled by one author, eliminates chance errors and endows the conclusions drawn from it with an unusual amount of certainty of being correct.

My own views I might then briefly summarize as follows:

1. The operative treatment of uterine myoma has undergone a thorough reform. Its result is a reduction of the appalling operative mortality to almost nothing. The life of many hundred patients has been saved.

2. These splendid results permit a corresponding widening of the indications for operation. There cannot be any longer any waiting for symptoms which threaten the patient's life. The tumor should be removed long before its size would preclude its extirpation through the vagina.

3. Whenever possible the operation should be performed through the vagina. This guarantees the smallest risk.

4. One can assert that the operation of hysteromyomectomy has reached its state of perfection, and in this respect today is superior in its technic to any other abdominal operation, not excluding ovariotomy. Further progress will be limited to minor details.

5. The entire evolution of the operation, described in these pages, has taken but forty years, being thus included within the lifetime of some still active surgeons.

TABLE I

OPERATIONS	1885-1892 Op	D	1893-1897 Op	D	1898-1902 Op	D	1903-1907 Op	D	1908-1912 Op	D	1913-1916 Op	D	1917-1921 Op	D	1922-4/1/23 Op	D	TOTAL Op	D	Mortality
Laparotomies																			
Conservative Myomectomies	3	2	15	0	13	3	17	2	17	0	21	0	9	1	4	0	99	8	8 %
Amputatio Supravaginalis	18	3	46	6	28	2	9	0	23	0	18	1	11	1	4	0	157	13	8.2 %
Panhysteromyomectomies	7	1	29	4	65	2	87	5	104	5	45	5	35	1	10	0	382	23	6 %
Combined Uterus Extirpation (per vaginam et per abdom.)	—	—	10	3	14	1	12	1	10	1	5	0	2	0	—	—	53	6	11.3 %
Total Number	28	5	100	13	120	8	125	8	154	6	89	6	57	3	18	0	691	50	7.2 %
Mortality	17.9%		13%		6.6%		6.4%		3.9%		6.8%		5.3%		0%		7.2%		
Vaginal Methods																			
Conservative Myomectomies	—	—	—	—	18	0	20	0	12	0	9	1	2	0	1	0	63	1	1.6%
Total Extirpation of Uterus	—	—	76	2	169	3	272	6	360	1	223	1	100	1	18	0	1218	14	1.1%
Total Number	—	—	76	2	187	3	292	6	372	1	232	2	102	1	19	0	1280	15	1.2%
Mortality	—		2.6%		1.6%		2.1%		0.27%		0.86%		0.98%		0%		1.2%		
Total Number of all Operations and Deaths	28	5	176	15	307	11	417	14	526	7	321	8	159	4	37	0	1971	65	3.3%
Mortality	17.9%		8.5%		3.6%		3.4%		1.3%		2.5%		2.5%		0%		3.3%		

6. Excepting the truly conservative myomectomies, the radical operation should be given preference. Merely palliative measures, such as ligation of vessels, extirpation of the ovaries, etc., must be repudiated. Particularly objectionable is castration, whether obtained by operation or without operation by means of x-rays. This method is not only useless, but with the suppression of an important endocrine function, exerts a harmful effect on general endocrine activity and metabolism.

7. Vaginal operations not only minimize the immediate dangers of operation but offer security against some of the sequelae of laparotomy, especially the formation of a hernia.

8. Panhysterectomy is the operation of choice.

BIBLIOGRAPHY

[1]Reported in the Gynecological Section of the Tenth International Congress in Berlin.
[2]Zentralbl. f. Gynäk., 1888, No. 17.
[3]v. Ott: Operative Gynecology, p. 325.
[4]v. Ott: Operative Gynecology, General Part, p. 73.
[5]Zentralbl. f. Gynäk., 1892, No. 10 and Schurnal Akusch. i schensk. Bol. 1901, No. 11.
[6]Short report of 204 laparotomies, in the Festschrift for Professor Sslavjansky, Wratsch, 1888, p. 174.
[7]v. Ott: Operative Gynecology, p. 174.
[8]Eleventh International Congress, Rome, 1894. Described also in my Operative Gynecology, p. 358.
[9]Volkmann's Vorträge, Gynäkologie, 1891. No. 12.
[10]v. Ott: Operative Gynecology, p. 363.
[11]Sixth International Congress, Berlin.
[12]Sixth International Congress of Gynecologists, Berlin.

A ROUTINE TREATMENT FOR HYPEREMESIS GRAVIDARUM*

By Edward Speidel, M.D., Louisville, Ky.

THE rapid and continuous progress in surgery is due to the fact that standardized and exact procedures have been developed in the different operations. A gastroenterostomy and a hysterectomy are performed according to a definite technic regardless of any peculiarities of the individual to be operated on.

In obstetrics we still cling to many haphazard methods, antagonizing any attempts at definite procedures or innovations. True, some pioneers are trying to blaze the way.

Median or lateral episiotomy in every primipara, De Lee's prophylactic forceps operation and Potter's version are all aiming at an accurate and definite method for obstetrical deliveries.

Stroganoff and McPherson may be accused of having introduced an almost iron-clad procedure in the treatment of eclampsia. In the

most baffling of all our obstetrical complications, hyperemesis gravidarum, we still cling to haphazard methods.

Kosmak in his monograph "The Toxemias of Pregnancy," introduces the treatment with the following statement: "The cardinal fact to be borne in mind is, that no routine method applicable to any or all classes of cases can be recommended but that in each instance, particularly in the severer types, consideration must be given to the individual patient."

In hyperemesis we deal with a serious condition, the true nature of which is still in doubt. Upon our success depends the integrity of a pregnancy and often the life of the patient and we have nothing to guide us even in favored localities except the outcome of two or three chemical tests.

It should seem that, if a definite procedure were tried, the significance and the value of these tests in determining the progress of a case could be readily and accurately determined and in those cases without such advantages, the failure of the treatment itself would indicate that other measures would have to be resorted to.

No doubt the most important addition to our knowledge of the toxemias of pregnancy has been brought about through the investigations of Titus and Givens.

According to these authors, there is a carbohydrate deficiency in the maternal organism due to the unusual demand of the growing fetus for carbohydrates. If the diet of the mother does not supply this need, then the reserve store of glycogen in the liver is drawn upon, resulting in pathologic changes in the liver.

If the destruction has not gone too far, then the administration of glucose will regenerate the damaged liver cells and aid the liver in its fight against the toxins of pregnancy.

If fatty degeneration has taken place to any great extent, then the glucose cannot be absorbed and stored and an extreme degree of toxicity exists.

Based upon these facts Titus and Givens devised a blood sugar test by which the gravity of the toxemia may be determined.

A definite amount of glucose solution is introduced into a vein, taking thirty minutes for the introduction, a sample of blood having been taken previously. A second sample of blood is taken five minutes after the glucose has been introduced, the third sample thirty minutes later, the fourth and fifth samples respectively, one and two hours later than No. 3.

They claim that a liver depleted of glycogen, but not infiltrated with fat, should be greedy for sugar and should take it up from the blood stream faster than under ordinary circumstances, while a liver

with fatty infiltration and necrosis, would have its function in that respect impaired.

The test therefore depends upon the determination of the blood sugar in the five specimens taken. No. 1 represents the patient's condition before treatment, No. 2 shows the peak of sugar after the injection of the glucose and No. 3 shows the sugar reduction in thirty minutes. Bloods 4 and 5 show whether the condition has returned to No. 1 after this interval.

The test surely indicates the power of the liver to store glycogen, and a low sugar absorption, after the injection, may be held as a sign of extensive liver destruction and as a positive indication for interfering with the pregnancy.

The test is a very elaborate one and where such extensive laboratory facilities are at hand should prove of great value in the conduct of toxemias.

The ammonia-nitrogen content of the urine as advocated by Williams, is not generally accepted as a definite indication of the degree of toxemia.

Williams claims that a high ammonia coefficient shows a profound perversion of metabolism and the percentage of ammonia nitrogen above the normal 5 per cent is an indication of the degree of toxemia.

If the normal pregnant woman has 4 or 5 per cent and the early toxemias show from 20 to 25 per cent, it would seem that a gradual decrease in this coefficient towards normal would be a decided factor in indicating an improved condition. Then again an increase of 10 per cent or more of total nitrogen would be an indication for interfering with the pregnancy.

If generally accepted, it would be necessary to have the test made at least once a day for comparison and perhaps at times an examination of a twenty-four hour specimen would be needed.

Besides, the test is not so simple that it would be generally available. Those not accepting the test claim that the high ammonia coefficient is simply a manifestation of acidosis and the acidosis in hyperemesis is ascribed to the accompanying starvation.

We are in the same position if we depend upon the amount of acetone and diacetic acid found in the urine, for those ingredients are the direct results of the starvation

If we wait for such extreme signs as rapid pulse, elevation of temperature, jaundiced conjunctivae and coffee ground vomit, then interference with the pregnancy will generally be followed by the death of the patient.

Consequently until the cause of the toxemia is definitely known and until we have a specific therapy, the question finally resolves itself into nourishing the patient in such a manner as to give the stomach a

complete rest, until the vomiting stops and the toxemia subsides or the patient is carried beyond the time when the toxemia in many instances would seem to be at an end.

It is claimed that in early pregnancy the entire metabolism is performed by the liver of the patient but when the liver of the fetus is fully developed that organ relieves the maternal organism of a good deal of its work and toxemia due to imperfect functioning of the maternal liver ends.

Hyperemesis generally shows itself in the first three months of pregnancy. The liver of the fetus by the end of the third month is large enough to fill almost the entire abdominal cavity and it may be assumed that even before this it enters upon its function and in so far lessens the strain upon the maternal liver.

This would explain the cessation of vomiting after a definite time in apparently hopeless cases, especially in such in which for religious reasons interference with the pregnancy was not tolerated.

A careful method therefore should be followed in the conduct of these cases so that improvement may be expected after a certain time or the reverse be accepted as a definite indication for interrupting the pregnancy.

The following routine has been followed more or less in twenty-four cases in the last two years, with uniform success in twenty-two cases that were under complete control. In two cases in which the writer was only called in as an occasional consultant, death of the mother followed interruption of the pregnancy in one instance, while the other died from the profound toxemia when the consultation showed that nothing could be gained by so late an interference with the pregnancy.

It is of great importance in instituting the routine treatment that the husband and the family be impressed with the fact that a very serious situation confronts them and that the successful outcome of the condition, even the life of the patient, depends upon their absolute cooperation.

The condition is serious enough to demand hospital conveniences if they are at all accessible and a special nurse in complete charge of the patient. If the case has to be conducted in a home, then hospital conditions should be simulated as much as possible.

At any rate the sick room should not be in close proximity to the kitchen as occurred in one of my consultation cases.

The room should be flooded with sunshine and fresh air, the patient's face being shaded or smoked glasses worn to protect her from any glare. This is considered better than the gloomy darkened room suggested in most instances.

The family and husband must be absolutely excluded. This ap-

plies especially to the husband whose presence at once arouses the sex instinct in the patient and reflexly causes emesis.

All administration of food and even water by the mouth should be stopped at once.

The daily routine is begun at 7 A.M. by irrigating the large bowel with a gallon of warm solution containing two rounded tablespoonfuls of sodium bicarbonate. The solution is introduced slowly through a No. 20 catheter and when the patient strains she is allowed to expel the solution along side the catheter. More solution is allowed to run in and the catheter is withdrawn when the final pint has been introduced in hopes that the patient will retain and absorb a considerable part of it, thus supplying that amount of fluid to the system and the sodium bicarbonate combating some of the acidosis.

A catheter with the opening at the side of the tip is preferred, because it is less apt to become occluded with fecal matter than the rectal tube, which has the opening at the end.

At 8 and 12 A.M. and 4 and 8 P.M. 250 c.c. of the feeding solution are slowly introduced into the rectum through a No. 12 catheter with a glass funnel attached, the patient lying in the left lateral position with the hips elevated and retaining that position for a half hour after the introduction of the fluid.

The feeding solution warmed to body temperature before each introduction is composed of 50 grams of glucose, 100 c.c. of trophonine or panopepton, 20 grams of sodium bicarbonate and enough water to make 1000 c.c., this amount being sufficient for one day.

Sixty grains of bromide of sodium are added to each dose of the feeding solution just before introduction and if the patient is restless 30 grains of chloral in addition are dissolved in the 8 P.M. feeding. As the patient improves the amount of sodium bromide may be reduced gradually.

From the beginning an ampoule of corpus luteum extract should be given once or twice daily intramuscularly or intravenously as is advocated of late until erythema indicates that sufficient has been given.

J. C. Hirst and others report remarkable results with this remedy. They do not, however, report in detail what accessory measures are used in the conduct of their cases. It is inconceivable that extreme cases of vomiting would respond solely to the introduction of a few ampoules of corpus luteum.

Accordingly, while the writer has never seen any direct results following the use of this remedy, still he feels it proper to continue with it until its place in the therapy is definitely settled.

After three days of this regime the treatment is supplemented by the introduction of 500 c.c. of sterile 10 per cent glucose solution

intravenously.   The glucose not only relieves the carbohydrate defi-
ciency caused by the demands of the fetus upon the mother and lack
of it in the diet that she has been able to take but it will be absorbed
directly by the liver and will aid in regenerating the damaged liver
cells if the destruction has not gone too far.

The solution as is well known must be carefully filtered and ster-
ilized and introduced into the vein slowly at body temperature.   At
least one-half hour being given for the introduction of 500 c.c.

In consequence of a reported fatality from coma following the
intravenous introduction of glucose solution in a diabetic, it will be
wise in all cases of hyperemesis not to use the glucose if the urine
responds to the test for sugar.

The rectal treatments are continued for the succeeding days and
on the sixth day a second glucose injection is given intravenously.
Continuing the rectal treatments, gastric lavage is practiced on the
eighth day with a half gallon of sodium bicarbonate solution contain-
ing a rounded tablespoonful of the soda, and a half pint of the solu-
tion is poured into the stomach through the tube at the end of the
lavage.   This is generally retained.

Administration of food is then begun tentatively on the ninth day,
the patient being given a Holland rusk or shredded wheat biscuit
twice a day.

The cereals are slowly added in the succeeding days, the rectal
feedings being gradually reduced in number as the patient is able
to retain food by the mouth.

This routine embodies well recognized measures in the treatment
of hyperemesis and should form the main basis for the treatment of
each case.   Additional measures may be used in conjunction with it
if considered necessary.

Adrenalin solution advocated by some writers may supplement or
take the place of the corpus luteum solution or the latest innovation,
feeding by the duodenal tube as advocated by Paddock, may be
added to the treatment.

If the patient vomits in spite of the rigid regime to which she has
been subjected, then it may be assumed that every reasonable means
has been exhausted to correct the condition and the physician may
conscientiously interrupt the pregnancy with the knowledge that the
patient is in a fairly good condition to pass through the ordeal.

If laboratory facilities are at hand and daily tests for the ammonia
coefficient can be made, it should surely be possible to make a very
satisfactory prognosis from the results taken from such carefully
conducted cases.

The blood sugar tests if available would be of still greater impor-
tance as they should quickly determine whether in the given toxemia

we are dealing with a liver that can rehabilitate itself or one in which destruction has gone so far that it would be no longer safe to defer interruption of the pregnancy.

Individualization is not indicated in these cases, because all suffer from the effects of starvation, plus a certain amount of toxemia.

With the stomach out of commission, the modern methods of nutrition included in the routine are available and of these the intravenous glucose may be conceded to be the most efficient and definite to combat the carbohydrate deficiency.

With the acidosis due to the starvation more or less eliminated, the efficiency of the various chemical tests to determine the degree of toxemia is greatly enhanced, and it should be possible then to determine definitely whether a pregnancy can be safely continued.

If many of these cases are conceded to be neurotic, then the hypnotic effect of the continuous therapeutic measures should go far to effect a cure.

In malingerers who are simulating nausea to induce the physician to relieve them of an unwelcome pregnancy, the persistence with which treatment is continued and the result of the chemical tests, if available, should soon convince them that their attempt is futile.

It should be extremely rare then that a pregnancy must be interrupted for this condition.

REFERENCES

Williams: Obstetrics, D. Appleton & Co., N. Y. *Kosmak:* The Toxemias of Pregnancy, D. Appleton & Co., N. Y. 1921. *Titus and Givens:* Jour. Am. Med. Assn. Jan. 14, 1922. *Paddock:* Surg. Gynec. and Obst., May, 1922.

717 FRANCIS BUILDING.

DRY LABOR*

By John Osborn Polak, M.D., F.A.C.S., Brooklyn, N. Y.

DRY labor, its proper conduct and its successful issue, brings up for discussion a subject that must have given every conscientious obstetrician hours of worry. That we may have a clearer understanding of some of the fundamentals involved I am going to discuss the subject from a clinical standpoint, based on active obstetric experience of over twenty-five years, under the following headings:

1. When rupture of the membranes occurs, with unprepared soft parts, before labor begins, in primiparae or multiparae, the pelvis and child being relatively normal.

2. When the membranes rupture at the beginning of labor with the cervix undilated; head or breech engaged or engageable; the pelvis presumably normal.

3. Dry labor with undilated cervix in the minor degrees of relative disproportion, where under ordinary circumstances with membranes intact, we would give the woman a full test of labor.

Dry labor makes delivery more serious for both the mother and the fetus, this is especially so in primiparae by exposing the mother to more prolonged effort, general and uterine exhaustion, greater trauma, the greater possibility of operative interference and infection, and finally to the increased possibility of hemorrhage in the third stage and a slower convalescence.

The fetal mortality is definitely increased from the continuous pressure on the presenting part, resulting in greater moulding, cerebral congestion, operative injury, interference with the feto-placental circulation and fetal infection through the placenta and cord as demonstrated by Slemons, DeLee and Beach. It is therefore evident that early rupture of the membrane may be a serious complication for it always prolongs labor and subjects the participants to greater danger.

The undilated cervix offers the primary obstruction, exciting the uterine muscle to reflex irritability and therefore presents the chief subject of this discussion.

All authorities are agreed that physiologic dilatation of the soft parts is best; yet in dry labor we are robbed of the mechanical advantage of the hydrostatic action of the fore-waters, which normally soften and open the cervical canal. Hence the cervix being unsup-

---

ported and having its return circulation blocked becomes markedly edematous and unyielding, exciting spasmodic but powerless uterine contractions which mould the uterus upon the contained fetus and form a contraction ring just above the site of the internal os.

Have we any substitutes for the absence of hydrostatic dilatation, and if we have where do they fail, and if they succeed what is the added risk? It is a fundamental principle that the cervix must be open before the baby can come out, an axiom which is daily violated by the practitioner, yet it allows of no argument. How then can we attain this dilatation? This question is at once answered: (a) by the use of the dilating bag; (b) by manual dilation under anesthesia; (c) by time and morphine analgesia; (d) by the colpeurynter; (e) by the properly applied vaginal pack; (f) by surgical incision. But all of these several solutions have their disadvantages and dangers, and often fail to give the desired dilatation in time to allow the passage of a living child without extensive trauma to the mother's soft parts.

The bag is uncertain, it displaces the presenting part and may allow prolapse of the cord and is apt to cause the formation of a retraction ring just above the bag. According to Dorman it results in operative termination in over half of the cases and increases the dangers of sepsis as it is applied to the inside of the cervix and every abrasion, however small, is drained by the cervical lymphatics and excites a parametrial reaction for the bag dams back the secretions.

Manual dilatation might better be described as manual laceration for there never was a cervix manually dilated in which a laceration of some degree could not be demonstrated; furthermore, delivery after manual dilatation must always be accomplished by some operative measure which further increases the trauma.

Beck in a recent paper based on the study of clinic cases has shown what can be done by time and morphine. This report is worthy of consideration, yet it leaves a number of cases to the field of operative procedure.

The vaginal bag or colpeurynter against the cervix has had little recognition in this country in recent years; yet personal experience has made me feel it deserves further trial. Its advantage over the intracervical bag is that when we place a bag of sufficient size within the uterus, to iron out the cervix, the presenting part is dislodged and a retraction ring is formed just above the upper margin of the bag which prevents descent of the presenting part; the vaginal bag, on the other hand, while it raises the presenting part, does compress the cervix between the bag and advancing part, thus thinning and softening the margin of the cervical rim.

Plugging the vagina with sterile moist cotton or gauze when properly done has many advantages over the bag, for with the patient in the Sims position and the perineum retracted with a Sims speculum, it may be accurately applied so that it fills every part of the vagina; it may be applied against the cervix so accurately that equilateral pressure is made on every portion of the cervical rim which is thinned out between the advancing head and the vaginal plug. The gauze or boiled cotton batting should be moistened with a solution of sterile boroglyceride which prevents abrasions of the soft parts and softens the tissues.

Dürrhsens' incisions presuppose an effaced cervix and thoroughly meet the surgical requirement, but clinically the extent of the incision is difficult to limit; suture is not always successful and a pathology which may need subsequent operation is frequently a result.

With this brief consideration of the difficulties which result from soft part dystocia in dry labor and a recital of the several methods employed for its relief, I will now take up the discussion of this application and our management of illustrative cases under the three headings stated at the beginning which may be briefly summarized as follows:

In the first class, where rupture of the membranes has occurred before labor begins, with unprepared soft parts, with the head in the brim, and the head and pelvis presumably normal, experience has taught us to let the patient absolutely alone, for neither child nor mother suffers any injury from ruptured membranes, so long as the woman is not in active labor and the cervix is not infected by repeated vaginal examinations or manipulation. The ball valve action of the head more or less effectively blocks the egress of fluid and retains a considerable portion of the amniotic liquid. Spontaneous labor will usually occur in due time and should be well established before any adjunct to favor dilatation need be considered.

Only in old primiparae where the value of the child is of paramount importance from a legal standpoint, can it be conceived in the light of an extended experience that surgical interference is justifiable.

In the second class, labor should be allowed to progress for several hours or until the pains are strong and regular before resorting to measures which will aid in the dilatation of the cervix; then a careful examination should determine the condition of the cervix and the progress of labor. If the cervix is thinned out, even though the external os is no larger than 2 or 3 cm., morphine, scopolamin and time alone will almost always effect complete dilatation. On the other hand, if the cervical rim is thick and unyielding, the patient

after proper surgical preparation of the vulvar orifice should be placed in the Sims position, the perineum retracted with a Sims speculum, and the vagina packed with boiled cotton batting moistened and wrung out in a weak solution of boroglyceride, one part to eight of sterile water. The tampon should be closely applied to the fornices and over the stretched cervix, and the vagina firmly packed. This excites uterine contractions, keeps the cervix in close apposition to the presenting part, softens it and irons out the canal. A hypodermic of morphine, gr. $\frac{1}{4}$, and scopolamin, gr. $\frac{1}{100}$, at the completion of the packing acts as a valuable adjunct by giving the patient rest between pains and apparently relaxing the cervical spasm. In a few hours dilatation is completed, the plug is expelled and the presenting part pushed down to the pelvic floor.

Nothing new is claimed for this method except the addition of the boroglyceride. Plugging has been used in the Rotunda for years, but has fallen into disuse in this country, probably owing to the fact that unless it is done properly the results are variable.

Long experience has convinced me that all the other methods of artificially dilating the cervix are inferior and are fraught with greater danger. Dilatation is secured without trauma and the secretions are not dammed up behind the plug as is the case with the bag.

In the third class where some relative disproportion between the head and the pelvis obtains, complicated with dry labor, too much time must not be wasted on the management of the soft part dystocia, for the child's chances are lessened materially in this class by a prolonged and ineffectual test, owing to the interference with the fetoplacental circulation and the cerebral pressure. More than twelve hours of labor should not be permitted if progressive advance is not demonstrated; for the dangers from sepsis are constantly increasing and late operations are attended with high mortality. It is in this class that section deserves consideration.

Abdominal delivery in dry labor, however, is always a serious undertaking; for statistical studies have shown that both the maternal morbidity and mortality in section are directly increased as the length of the labor is prolonged, and both are higher if the membranes have ruptured. In my report recently published on the mortality in 2200 cesarean operations, which included the work of some of the obstetric masters, the mortality ranged between 6 and 14 per cent in women who had been in labor for periods of over 12 hours. The morbidity seemed to depend not only on the absence of the membranes but upon the number of vaginal examinations made after the membranes had been ruptured; hence it will be seen that the case with ruptured membranes must be considered as potentially infected. This is explained by the fact that the interior of the uterus and the placen-

tal site are exposed in dry labor to infection from the vagina. Again dry labor is always prolonged, section on a tired uterus is often attended with greater blood loss from uterine atony and this further reduces the individual resistance.

When the classical section is done late in labor, where the membranes are ruptured, two clinical dangers must be counteracted as far as possible, namely: uterine relaxation and the infection of the uterine wound. To meet these dangers to the woman, the vagina should be thoroughly iodized before operating, and after the placenta has been removed the interior of the uterus should be firmly packed through the hysterotomy wound with iodoform gauze to stimulate uterine contraction. The pack is allowed to remain *in situ*, to be expelled by uterine contractions. This occludes the uterine sinuses for it is acknowledged that a relaxed uterus opens a way to sepsis and conversely a contracted uterus is the best barrier against infective invasion. When we realize that streptococci can be demonstrated in the interior of the uterus in over 60 per cent of normal puerperae on the fifth or sixth day, or just at the time when the uterine wound, if there is any defection in suture or asepsis, can be inoculated by the cocci and infection extended from the interior of the uterus to the peritoneum, it is a wonder that even a larger percentage of sections do not end fatally. It is because of this clinical knowledge that efforts have been made to perfect the transperitoneal and extraperitoneal methods of uterine exclusion in performing section.

Krönig, Hirst, Beck, Frank and Latzo have all perfected procedures with the idea of protecting the peritoneum against extension of infection from the inside of the uterus through the hysterotomy wound. Their methods do not save the frankly infected case, therefore it behooves us in dealing with the border-line cases of dry labor in which the membranes are ruptured, to conduct such labor with the greatest asepsis and without vaginal examinations, using only abdominal examination and the rectal touch to determine the degree of dilatation of the cervix and the descent of the presenting part.

In conclusion I would urge: 1, that all cases of dry labor will fall within one of three classes, already described; 2, that it must be admitted that each case of dry labor should be considered on its individual merits; 3, that the determining factors in selection of method are the position of the presenting part, the length of the labor and the condition of the cervix; 4, that where infravaginal delivery is possible that cervical dilatation is best handled with morphine and vaginal plugging, and finally, 5, when section is elected, owing to the fact that all dry labors are potentially infected, the classical operation is not the one of choice, but we should select one that excludes the peritoneal infection by peritoneal flaps.

TRANSPLANTATION OF HUMAN OVARIES: PRESENT STATUS AND FUTURE POSSIBILITIES*

By WILLIAM SEAMAN BAINBRIDGE, Sc.D., M.D., C.M., NEW YORK, N. Y.

IN 1894 Knauer[1] made the first attempt to transplant ovaries in animals and proved that if ovaries were removed and implanted at another site in the same animal, atrophy of the uterus would not take place. Later, Grigorieff[2] repeated the experiments of Knauer and confirmed his findings—that ovaries excised and reimplanted in continuity with the tubes, in the same animal, would live and form ova and that a pregnancy could be produced. Ribbert[3] made experiments with guinea pigs and found that 30 days after the grafts were implanted, the essential parts of the ovaries were well preserved and in a state of proliferation. After 150 days these ovaries showed no atrophy—only normal ovarian development. Transplantations from one animal to another were less successful. Foa[4] made many observations in transplantations with rabbits and found that the ovaries of newly born rabbits live, and functionate much more rapidly than those of full grown rabbits. The ovaries of newly born animals, when transplanted into fully grown ones, very soon assume the characteristics of the mature ovary, but retain their juvenile characteristics when transplanted into young animals.

Very soon after these experiments on animals, Frank Cramer,[5] Tuffier,[6] Morris[7] and the writer did their transplantations in the human subject. Tuffier has performed more than 300 transplantations of ovarian tissue and his records show no mortalities. During the war and early postwar period it was my privilege in Paris to observe Tuffier's work along this line and he kindly furnished me with some of his unpublished data which, with his permission, I have freely quoted in this paper.

There was a period when the excision of the ovary was the rule rather than the exception and a cystic ovary was a surgically doomed ovary, but the pendulum has swung in the opposite direction and today the trend of surgery is towards saving the ovary whenever feasible. Where simple ovarian cysts are found and some glandular tissue still remains, complete ablation of the organ is no longer considered the only "safe" operative procedure. Improved technic has made possible the excision of the cyst, careful suture and plastic work on the ovary, with the result that many a woman has been saved from mental and physical handicap and perhaps life-long re-

gret because of the conservation of this important factor in the cycle of internal secretion. Happily, the ovary instead of having to prove its right to remain seems now in a position to demand of the surgeon the reason for its removal. Of course, to leave an ovary where extensive adhesions or large varicose veins probably will cause disease later, or where it will be interfered with by attachment to other organs, so situated as to render repeated traumatism and even degeneration likely, is a questionable procedure. On the other hand, when we fully realize the mental and physical upheavals consequent upon the sudden removal of the ovarian secretion from the body, we need to weigh well in each case the advisability of complete ovariectomy. It is true that the transplantation of ovaries, though still in the experimental stage, is attended with considerable success, yet there should be no complete ablation of this significant link in the internal secretory chain without an attempt to substitute ovarian nutrition.

Primarily, transplantation is employed for restoration of fertility after the removal of the ovaries, or to relieve distressing symptoms of artificial menopause following panhysterectomy. It has been repeatedly shown that, where the uterus is intact, the transplantation of an ovary or piece of ovary after castration will maintain, for a time at least, the function of menstruation. Tuffier always transplants ovaries in women under 40, where for conditions, other than malignant ones, he has performed a complete or partial hysterectomy. In one of his cases which I observed at his clinic in Paris recently, he removed the left ovary and both tubes because of a bad pus condition. The right ovary, which was normal, was also removed and inserted in an extraperitoneal pocket which was made under the rectus muscle. Tuffier explained "that when one ovary and the tubes were removed for a pus condition, adhesions frequently formed about the ovary which was left and the result was much pain and discomfort. He believed it more satisfactory to transplant the normal ovary. He had had more than 300 such cases and found that these women experienced regular menstruation for four or five years following transplantation and the menopause then occurred naturally and without serious symptoms. The first menstrual period after the operation was delayed for a time but the only disagreeable symptoms experienced by the patient were a slight tenderness and swelling at the site of the abdominal graft and even these minor discomforts vanished at the first postoperative menstruation." Such an eminent authority as Biedl[8] says "that the experiments of several well-known scientists have shown that the presence of even a portion of one ovary in any part of the body is sufficient to maintain the complete anatomical integrity and functional activity of the genital organs." However, I have been unable to find any case, in medical literature,

where the grafting of ovaries has succeeded in reestablishing men-
struation after the normal menopause.

In transplanting human ovaries various sites are selected, but
for therapeutic effect alone the usual site is the abdominal wall in
the region of the rectus muscle, partly because the blood supply here
is favorable for the graft and partly because the graft is more ac-
cessible should the grafted tissue become cystic. Tuffier has trans-
planted more than 200 grafts in the abdominal wall, outside the
peritoneum, or in the subcutaneous tissue. In three cases he also
grafted ovarian tissue in the posterior part of the mammary gland,
his object being to discover a favorable anatomical ground which
would supply permanent vitality to the graft.

In my own cases where autogenous,* homogenous or heterogenous
transplantation is for therapeutic reasons, I make a pocket behind the
rectus muscle, insert the graft and anchor it in place lying on the
deep epigastric artery and veins, in close proximity to lymphatic
radicals—where it will not be likely to suffer traumatism.

When the graft follows the removal of diseased ovaries (in non-
malignant cases, with the uterus intact), for the purpose of fertili-
zation, I remove the ovarian tissue from the mass and, when sur-
rounded by septic material, employ the cautery or electric sealpel,
afterwards excising the nearby tissue which may have become de-
vitalized from the heat. I then slit open the fallopian tube, insert
and bring into close relationship the graft, stitch a peritoneal or an
omental flap or fold over the ovarian tissue and fasten it to the
uterus or broad ligament. When the transplantation follows the
removal of both ovaries and fallopian tubes, I graft the ovarian
tissue to the stump of one of the tubes, or if there is enough normal
ovarian tissue available, to the stumps of both tubes.

In one instance, where I followed the autogenous implantation,
after complete ablation of the ovaries and tubes for double salpingo-
oöphoritis, with pelvic abscess, the patient had twelve years of men-
struation, a normal pregnancy and an uncomplicated menopause at
fifty-one years of age. A detailed history of the case is reported
at this annual meeting of the American Association of Obstetricians,
Gynecologists and Abdominal Surgeons.[13]

Another example is one in which, after panhysterectomy for mul-
tiple fibroids, including one tumor as large as a grapefruit, I closed
the peritoneum, made a pocket externally within the aponeurosis—
extraperitoneally and behind the outer edge of the rectus muscle—
placed the raw surface of the ovarian capsule against the deep epi-

---

*Where the writer has used autogenous, hemogenous or heterogenous in this paper, the
terms are intended to be defined as follows: *Autogenous:* An implantation of self-produced
tissue. *Homogenous:* A transplantation of tissue where the recipient and donor are geneti-
cally related. *Heterogenous:* A transplantation of tissue between recipient and donor where
there is no blood relationship. *Heterologous:* A transplantation of tissue between a human
being and an animal.

gastric artery and veins and closed the aponeurosis, leaving the autogenous graft in this position. The patient who was at the menopause at the time of operation and showed distressing symptoms of the climacteric, reports that during the year since the transplantation she has had 100 per cent more vitality and is no longer troubled with palpitation or hot flashes. Indeed, so striking is the change in her condition that she, as well as her relatives, comment on it. Psychologic effect has had nothing whatever to do with the improvement, as the patient was not told of the transplantation until recently. She was merely requested to watch for and report on any tenderness at the site of the graft, which might occur coincident with the time of her preoperative menstrual periods. This case would seem to prove that the ovary in its new site had gone on functioning—giving forth its internal secretion and stabilizing the entire organism. This has been borne out in many other of my cases.

It is interesting to note that after the transplantation of an ovary for the purpose of fertilization, the graft, at first, apparently lives in its new surroundings by inhibition; it is not until vascularization is reestablished that the ovary is able to resume its ovulation. Tuffier says that the date of the first appearance of menstruation after the transplantation is of much importance, since he believes that if menstruation appears sooner than four months after the new graft is implanted, the flow is due to a piece of the original ovary which was not excised—and not to the new graft. My experience has been that in a number of cases, where there could be absolutely no doubt of the total excision of the ovaries—followed by autogenous ovarian graft—a normal menstruation occurred within three months of operation, one in six weeks.

There is considerable question as to whether the heterogenous graft is ever as successful as either the autogenous or the homogenous. Of course, both the homogenous and heterogenous grafts are apt to suffer loss of vitality by preservation in physiologic salt solution between the two operations and many writers claim that ovaries preserved in cold storage are quickly reabsorbed. For successful transplantation between patients, the chief requisite seems to be simultaneous operation. The lack of success with the heterogenous transplantations very naturally leads one to the question of whether grafting according to the donor law might not be advantageous in tissue transplantation as in skin grafting. During the war Crile demonstrated that skin grafting seems to take along blood law lines. In a report which I made to the United States Government in 1919,[9] I suggested that if the donor law is to apply to the transplanting of skin, then when transplanting any tissue we should conform to the same law. It may be that this will make possible greater success in transplanting

such glands as the ovary and the thyroid. Investigation may prove that more favorable results are obtained in tissue transplantation not only when the graft conforms to the donor law but when it is in direct continuity with the veins and arteries as well. Direct vascular continuity in the transplantation of thyroid and ovarian tissue seems to offer a difficult but a promising field for future research.

Tuffier says there are two phases of transplantation, which have no influence on the therapeutic value of ovarian grafts—the *nature* of the disease which necessitated the removal of the ovaries and the *duration* of the disease. Among his patients, where excision of the ovaries was necessary and later ovarian grafting performed, were over one hundred suffering from salpingitis, some of these with suppuration at the time of operation, and many cases of multiple fibroids, extra-uterine pregnancies and a number of pathologic conditions—other than malignant ones. While the nature and duration of the disease exerted no influence on the grafts, the age of the patient, on the other hand had considerable effect on the therapeutic results. Foa demonstrated this point very clearly in his experiments with rabbits.

The ovaries bear an important relation to the normality of the individual[12] and an acute surgical menopause—the sudden ablation of the ovaries in women before the climacteric—is a much greater strain on the balance of the individual than the gradual withdrawal of this potent secretion by the natural senescence of the menses. There has long been an effort to obtain a drug to alleviate the morbidity of this period and the results of the ovarian extracts and their derivatives vary according to the viewpoint of the particular writer. In many cases of hypothyroidism, thyroid extract has proved of great benefit. Both Hertoghe[10] and the writer have obtained highly successful results with thyroid medication and there are many authors who claim that equally favorable returns may be secured with the ovarian extracts, especially corpus luteum. But in thyroid therapy, above and beyond the temporary results obtained by thyroid medication is the greater work accomplished by thyroid transplantation. In instances where the gland was transplanted from an animal to a human being or from a human to a cretin, and lived, the graft, after a time, degenerated or disappeared by atrophy, but in numbers of cases, as reported in an earlier paper,[11] there was marked improvement in the individual for a time after the engrafting of the thyroid. *Transplantation* of either ovarian or thyroid glands has secured results beyond the point experienced by the use of glandular therapy. In this relation Biedl says: "The medical method is in reality a substitute for the surgical and is a less perfect and less certain imitation of natural measures. Where the extract is employed, only that proportion of the active substance which is, for the time being,

in the tissues and this is doubtless very small, becomes absorbed—while after transplantation the increase is incalculable because there is constant production.''

From careful observation in numbers of ovarian transplantations and from the written experiences of others in this field, the writer has drawn the following conclusions:

(1) That the ovarian secretion is stimulant and tonic and that the sudden ablation of the ovaries in a woman before she has reached the menopause, without the substitution of an ovarian nutrient, may cause very distressing mental and physical symptoms.

(2) That the transplantation of ovarian tissue, either autogenous or homogenous, has proved successful for both therapeutic and fertilization purposes in human beings as well as animals.

(3) That for purely therapeutic uses an implantation may be effective at any one of several sites but behind the rectus muscle, where the graft will be removed from points likely to suffer traumatism, but in close proximity to the vascular and lymphatic systems seems the most satisfactory site.

(4) That for purposes of fertilization, where the ovaries have been removed and the uterus is intact, in a woman of child-bearing age, a normal piece of ovarian tissue grafted in continuity with the fallopian tubes, or at the stump of a tube, if the tubes have been excised, may live, form follicles and ova and a pregnancy be produced from the transplanted ovary.

(5) That in the transplantation of ovarian tissue, the closer the relationship of the donor and recipient the better, though such relationship is not necessary for purely *therapeutic* purposes.

In presenting this paper the writer realizes that the whole subject of endocrinology, both in its medical and surgical aspects is still in its infancy and that there is great danger of exaggeration and overstatement in tabulating conclusions, as is true in any new line of endeavor. However, the results so far obtained are sufficiently encouraging to warrant a firm belief that there is much of real benefit for humanity in this field of research.

BIBLIOGRAPHY

(1) Centralbl. f. Gynäk., 1896, xx.   Wien. klin. Wchnschr., 1899.   (2) Centralbl. f. Gynäk., 1897.   (3) Über Veränderung Transplantation Gewebes, 1897.   (4-5) Trans. from Wchnschr., 1906, No. 39.   (6) Etude chirurgicale sur 230 greffes ovariennes, 1921.   (7) New York Med. Rec., May 5, 1906.   (8) *Biedl*, Internal Secretory Organs, 1913.   (9) U. S. Naval Medical Bulletin, Jan., 1919.   (10) Woman's Med. Jour., March, 1915.   (11) Oration in surgery, Annual Meeting Maine State Medical Society, June, 1915.   (2) Woman's Med. Jour., March, 1915.   (3) Am. Jour. Obst. and Gynec., 1923, v, 379.

34 GRAMERCY PARK.

THE SURGICAL TREATMENT OF CERTAIN PUERPERAL INFECTIONS*

By J. F. Baldwin, M.D., F.A.C.S., Columbus, Ohio

A T THE meeting of the American Association of Obstetricians and Gynecologists in 1914, I read a brief paper on the treatment of puerperal thrombophlebitis. (*American Journal of Obstetrics and Diseases of Children*, Volume lxxi, No. 2, 1915.) My opening paragraphs read as follows:

"While the average mortality of puerperal pyemia is ordinarily regarded as between 67 and 75 per cent, it is probable that the mortality of pyemia due to infected thrombophlebitis, in which the veins of the broad ligaments, the internal iliac, or the ovarian are involved, is 100 per cent; at least I have not been able to find any cases of recovery without operation on record in which such a lesion was demonstrated by subsequent operation or history.

"The classical symptoms of infected thrombophlebitis are repeated chills, with corresponding wide fluctuations of temperature, with direct evidence to the touch of involvement of the veins of the broad ligaments on one or both sides. It is possible, as in the case reported by Jellett, that there may be no evidence of involvement of the broad ligament, but such a condition is a rare exception.

"Treatment of these conditions by vaccines and serums is quite uniformly conceded to be futile, and expectant treatment, if the diagnosis is correct, means a mortality of 100 per cent."

In that paper I quoted from (1) J. Whitridge Williams, of Baltimore who, in a paper published in 1909, reported five cases in which he had operated, these five being embraced in a study of 56 cases from the literature; (2) Hiram N. Vineberg, who had reported one case; and (3) Jellett, then Master of the Rotunda Hospital of Dublin, whose paper, published in August, 1913, presented quite an exhaustive discussion with earnest recommendation for operative treatment. He reported five cases. In my paper I reported four cases.

The treatment recommended by the surgeons from whom I quoted consisted in ligation of the infected vein or veins beyond the thrombus so as to prevent the escape of the infected material into the general circulation. In Vineberg's case he had in addition removed the uterus.

In my own cases I had done a hysterectomy because in my judgment that operation would usually reveal the presence of much more

pathology than appeared in the infected veins and on the average would give a larger percentage of recoveries.

That these cases were absolutely surgical in character I felt was well established by the writings alluded to. Within a few years, however, certain writers, most of whom, perhaps, are obstetricians rather than surgeons, have challenged this conclusion, and this has led me to make a review of the entire subject.

These writers, some of them at least, have apparently failed to carefully individualize their cases of puerperal infection. They seem to put them all in one group and thus do not differentiate between the cases that tend to get well of themselves and those which without intervention are doomed to a fatal issue.

Puerperal infection always follows some form of trauma by which an open surface is produced. A lacerated perineum or vagina, a lacerated cervix, or the raw surface left by the detachment of the placenta, is the avenue of infection. These infections may be divided clinically into five classes:

(1) The infection is limited to the endometrium, and among the older writers was known as sapremia. The early constitutional symptoms are quite similar to those of the more serious types of infection, as shown by chills, fever, sweating, etc., but they are usually accompanied by a disturbance of the lochia, with a bad odor. Ordinarily a piece of retained membrane or placenta is responsible, and with the expulsion or removal of that substance the symptoms promptly subside. Most writers leave these cases to Nature, though if the symptoms persist unduly the introduction of a wire loop, or better still the finger, with removal of the offending body, hastens the subsidence of the symptoms. "The establishment of proper uterine drainage, inducing retraction and contraction of the uterus, promptly controls this type of lesion and the fever subsides."[1]

(2) The infection passes beyond the uterine cavity into the broad ligament where an abscess forms in the connective tissue, which in due time can be easily opened through the vagina with drainage and prompt recovery. Even without intervention such abscesses will usually discharge in due time, but the delay is unnecessary and not devoid of danger. In this type of infection the bacterial invasion may possibly invade the lymphatics and thus extend into the surrounding connective tissue, reaching the peritoneum through the veins, and may result in the infection of class (5). The cellulitis in these cases frequently terminates in resolution. In that case the symptoms become less active, the mass is found hard and less sensitive, and in the end absorption takes place with complete recovery. The continuance of symptoms, increasing tenderness, and enlargement of the mass, indicate the presence of pus which should be evacuated.

(3) The infection goes to the pelvic peritoneum, by the lymphatics or through the tubes, and a pelvic peritonitis results with a collection of pus in the culdesac. In these cases adhesions usually form above the seat of infection, and the abscess can be readily opened by a free incision at the vault of the vagina, or without operation will perforate itself and discharge into the bowel, bladder, or vagina. These abscesses may assume huge proportions but the patient recovers promptly when drainage has been accomplished.

(4) The infection involves the subperitoneal connective tissue, and forms what some of the older writers described as "dry peritonitis." It resembles very closely phlegmonous erysipelas. The pus appears as a sheet lying under the entire pelvic peritoneum, and extending indefinitely upward. Drainage is impossible, and death always results promptly.

(5) This is the class of cases considered in this discussion. It embraces the infections of the pelvic veins and other infections not included in the other classes. Through the placental site usually, though the infection may enter at any other point, a phlebitis develops of the veins of the broad ligaments, and extends possibly into all of the pelvic veins, but is most serious when it involves the ovarian veins since these veins discharge on the right side directly into the vena cava, and on the left into the vena cava through the renal vein. If the involvement does not result in a purulent breaking down of the blood clot, resolution takes place, with prompt amelioration of symptoms and recovery, as is seen so generally in that form of phlebitis so well known under the old name of milk leg, or phlegmasia alba dolens. If infection takes place, however, then, as so graphically described by Murphy, the disease progresses from bad to worse, and a fatal result, unless there is intervention, is inevitable.

In this type of infection the initial symptoms are identical with those of the less serious types, but they do not subside. As a rule there will be repeated chills, wide excursions of temperature, much sweating, great prostration, rapidly developing anemia, and if the clot breaks loose and goes to the heart the usual symptoms of infected embolism.

Vaginal examination shows a failure in normal involution of the uterus, with marked tenderness on one or both sides or behind the cervix. Sooner or later a mass can be felt at one of these points. This may be well marked, or may be felt like a cord passing across. (I have never felt the "worm-like mass" mentioned by Williams, but that such a mass might be felt in certain cases is beyond question.) This mass must be differentiated from mere cellulitis in the broad ligament by the constitutional symptoms and the condition of the patient, but such a study of the patient, and careful digital study of

the pelvis, should enable a diagnosis to be promptly reached. While, as shown in the histories, careful examination will almost invariably give evidence of infected veins, it is possible that such veins might be out of reach and the diagnosis could then be made only from the history of the patient and constitutional symptoms. Although Polak[2] states that in these cases there is little or no leucocytosis, such has not been my experience as shown by cases reported in this paper.

The prognosis is practically hopeless, except as to a possibility of a very limited extent of infection. These cases are usually chronic in type, but occasionally a fulminant case appears in which a fatality is absolutely inevitable. As in tuberculous meningitis, if the patient does not die it is much more reasonable to assume that a mistake has been made in diagnosis than that recovery has occurred.

C. Jeff Miller,[3] of New Orleans, gives an exhaustive report on cases of puerperal pyemia. He gives a summary of 188 cases in which the operations were limited to the veins: 108 died, a death rate of 57 per cent. Excluding 15 cases operated upon *per vaginam*, we have 173 cases with 95 deaths, a majority of 55 per cent. As he reports several cases in which the end result was not stated, and in which we may doubtless assume that death occurred, the real operative death rate could not be much less than 60 per cent.

Ligation of the ovarian vein below its entrance into the vena cava or renal vein, requires necessarily a dangerous amount of manipulation of the vein with the grave danger of loosening the clot during manipulations and forcing it at once into the circulation. If this accident does not occur, the infected thrombus is left behind with all the risks that its presence implies, and a study of the pathology, as demonstrated in my own cases, shows that it is very seldom that the infection is limited to this one vein, or to the adjacent veins, but that it involves very extensively the pelvic veins in general, and very frequently the sinuses and veins in the wall of the uterus.

As the cases reported by Miller were treated by ligation of the infected ovarian veins, it is reasonable to assume that the more extensive infections present in most of my cases were not present in the cases collated by him and that if the more radical operation had been performed in his cases the mortality would have been much less.

During the time embraced by the operations detailed in this report, many other cases of puerperal sepsis were seen in which careful removal of the placental debris was required, and others in which it became necessary to open the vault of the vagina, or drain abscesses in the broad ligaments through the vagina or above the pubes.

As I had quoted in my original paper from the papers of Drs. Williams and Vineberg and of the Master of the Rotunda Hospital at

Dublin, I wrote to these three asking as to their present attitude toward these operations, and here quote from their replies:

Dr. J. Whitridge Williams, Professor of Obstetrics at the Johns Hopkins (February 23, 1922), writes in regard to puerperal thrombophlebitis: "I have had no experience with the method since my contribution in 1909. At that time I was very much impressed with the benefits derived from the operation, and should have used it in other cases had opportunity arisen."

Dr. Hiram N. Vineberg, under date of March 18. 1922, writes in regard to the operative treatment of septic thrombophlebitis: "I am still convinced of its value in properly selected cases, and when it is not too long deferred. When to intervene, and when not to intervene, is frequently a very delicate point to decide, hence the difficulty of laying down definite indications. For the past couple of years I have had no occasion to operate, but within the last few months I have had a very unusual, and in my experience unique, case of septic thrombophlebitis complicating a large fibroid tumor. At the operation the left infundibulopelvic ligament seemed slightly infiltrated, but it did not occur to me that the vein was the seat of septic thrombosis, as was disclosed at the autopsy. The chills and fever existing prior to the hysterectomy persisted afterwards, and continued until her death twenty-five days later. In view of these facts I soon arrived at the conclusion after the operation that I had to deal with a septic condition probably of the left vein, and desired to re-open the abdomen; but I could not get any consultant to concur with me, and in consequence had to abandon the idea. The autopsy revealed the left ovarian vein the size of one's thumb, filled with a purulent thrombus and lying in a bed of pus. Its removal would have been easy and in all likelihood the patient would have recovered."

In a letter from Gibbon Fitz Gibbon, Master of the Rotunda Hospital, Dublin, under date of March 14, 1922, after speaking of Dr. Jellett's report, he says: "Since I took charge here I have not met a case which suggested septic venous thrombosis. The acute septic cases which I have had to deal with have either recovered, or the ones that died were of general infection without any effort at localization. If a case does localize in the pelvic veins I have no doubt the removal of the focus would be beneficial and probably the only hopeful treatment. * * * I have opened a couple of cases but they have turned out to be local collections in the appendages with the pelvic veins free. Still they were cases in which recovery was greatly helped, or even resulted, from removal of the focus. This seems only rational, but the localization in the veins in severe cases I think is rather the exception than the rule."

In addition to the above expressions I have received numerous oth-

ers from obstetricians and surgeons who read the original paper, or who are familiar with the points at issue.

Dr. George Clark Mosher, Kansas City, Professor of Obstetrics, University of Kansas (March 17, 1922), writes: "I am convinced that your method of treatment of thrombophlebitis is correct. I believe the only technic offering any hope to these patients is embodied in your paper."

Dr. H. Wellington Yates, of Detroit (March 16, 1922), writes: "I never had but three cases of thrombophlebitis that were recognized as such. These three were all operated, all three having a hysterectomy with removal of the thrombus after tying. Two of the three had septic processes within the uterine wall, and in all the thrombi were infected and broken down. One case died within a few days, one made a prompt recovery without incident, and one had a slow recovery with a stormy time."

Dr. A. J. Ochsner, Chicago (February 28, 1922), describes some cases in which he resorted to constitutional and local treatment, and which recovered. His observation in regard to the cases is: "Their recovery made me think that probably my diagnosis had been wrong." He has seen but one case in which he thought operation indicated, but that patient was moribund, and no operation advised.

Dr. C. L. Bonifield, Cincinnati (March 9, 1922), writes he has never seen a case of the type in question but adds: "I think that the treatment which you institute is rational, and the results certainly commend it."

Dr. W. P. Manton, Detroit (March 12, 1922), writes that he has never had one of the advanced cases, but has opened from below in several early cases, his patients making good recoveries. He suggests the advisability of very early operating in these cases, so as to forestall the more serious condition, and adds: "Where the uterus is filled with small multiple abscesses the question of hysterectomy is answered."

Magnus A. Tate, of Cincinnati (March 10, 1922), writes: "If a case be at all operable I believe surgical interference is justifiable, and by this I mean ligating the vessel above the thrombus and not opening the vein, the uterus to be removed according to whether the indications point toward the invasion of the muscular wall."

Dr. Asa B. Davis, New York Lying-In Hospital (March 16, 1922), writes that last year they had in the hospital 5095 confinements, with 46 deaths. They have tried pretty much everything in the way of treatment in these cases except operation. At present the treatment consists in "sending such patients to the roof and forgetting them." He adds: "They usually run a rapidly fatal course, or a long drawn out one, and many of them recover."

A careful examination of these cases would almost certainly enable one to determine in which class each should be placed, and to institute appropriate treatment.

If all cases of puerperal infection, without any discrimination as to their character, are treated expectantly, an enormously large proportion will undoubtedly recover. Thus Cragin[4] in twenty thousand obstetrical cases found 2155 cases of infection. Of this number 1902 were cases of sapremia, all of which recovered from the infection. Among the 253 cases of bacteriemia there were 54 deaths, but he does not give details as to the immediate cause of death in these cases.

The late John B. Murphy,[5] of Chicago, in quite a full description of pelvic infections, mentions a case which he saw eleven days postpartum. The professor of obstetrics and gynecology with whom he saw the case in consultation was not anxious as to the outcome, but Dr. Murphy, with his broader knowledge of pathology, gave a fatal prognosis though the obstetrician thought her "fully out of the dangers of her confinement." A little later the patient developed infarcts and emboli, and Dr. Murphy adds: "That primary clot had passed through her veins from a phlebitis. It was septic. * * * That is the type of infection where the vein is involved." Again, "when the infection is carried into the broad ligament, with its many large veins present during gestation, a phlebitis or paraphlebitis may occur,—a septic phlebitis, I mean,—forming a thrombus and even emboli, and these septic emboli may be carried through the patient's system. You may have the venous type. Here you have a thrombophlebitis." * * * "Let us come to the next type of infection which occurs on the uterine surface. The most common position in the uterine cavity for serious infections to take place is on the placental base. When it does take place on the placental base, what has been separating the blood of the mother from the placenta? That thin layer of membrane. In the case of a virulent infection the microorganisms penetrate the membrane and you have infection in the vein, followed by thrombophlebitis, septic emboli, septic infarcts, endocarditis, and death."

Dr. E. P. Davis,[6] Professor of Obstetrics at Jefferson, recommends operative treatment in suitable cases. "With abdominal incision an accurate diagnosis can be made, foci of infection intelligently dealt with, and free drainage secured. Some most unpromising cases will recover with this treatment."

Henry Jellett,[7] late Master of the Rotunda Hospital, Dublin, who has had a large experience in the treatment of these pelvic infections, in speaking of these operations, says: "In cases of well-established pyemia in which thrombosis is present, they offer what is probably the only chance of saving the life of the patient, and in quite a number

of cases they are successful." If the ovarian veins alone are infected he advises their removal. if the uterine veins alone, ligation or extirpation. If both are involved, panhysterectomy. and hysterectomy if there is no obvious thrombosis found.

Charles Jewett[8] recommends hysterectomy in cases of abscess in the uterine wall, and exceptionally in putrid endometritis. He has had some "most satisfactory" results in some of these cases from ligation of veins in thrombophlebitis.

In *Surgery, Gynecology and Obstetrics*, April, 1922. page 327, is an abstract of an article by T. Roos,[9] on the treatment of puerperal sepsis. The author discusses the treatment of puerperal sepsis, with special reference to the work done in the last few years at the Hess Midwife Institute in Mainz. In view of the severity of the infection he thinks that no remedy should be left untried which offers any promise of success whatever. He decries any sort of local treatment. He thinks that removal of the infected organs through the abdomen or vagina will usually fail because of the entrance into the operative wounds of virulent bacteria. This he thinks can rarely be prevented. He favors (1) opening of abscesses in pelvic connective tissue; (2) incision. irrigation and drainage in diffuse purulent peritonitis; (3) ligation of veins in thrombophlebitis.

As none of my sixty-seven cases developed operative peritonitis, owing I think to the more or less complete preoperative sterilization by iodin of the vagina and endometrium and particularly to the closing off of the pelvis from the abdominal cavity by swinging around the sigmoid. I cannot but feel that Dr. Roos' objection to hysterectomy is ill-founded. though other writers express the same fear.

In the abstract department[10] of *Surgery, Gynecology and Obstetrics* of May, 1922, p. 363, is an interesting review of the prognosis and treatment of puerperal infection, by Marcel Arnandon, of Paris, who refers particularly to the studies of Couinaud, Potvin, Cotte, Cadenat and others. It is evident from this paper that these infections following abortion are regarded as more serious than those at full term. because of the frequency of criminal intervention. Treatment by serums and vaccines seems to have been of little or no avail, certainly not in the virulent types. Potvin, Cotte and Cadenat are particularly referred to as advising hysterectomy. but all agree as to the importance of making a diagnosis early in these cases, at which time a hysterectomy would give the most favorable results. Cadenat agrees with Faure in advising intervention after twenty-four hours, if the uterus is found empty and there is no amelioration of symptoms, but the rapid pulse continues with fever and chills.

De Lee,[11] in speaking of pus cavities from parametritis says that unless they are freely evacuated the patient may pass into a condition

called by the older writers "hectic" and may die of exhaustion, having wasted to a skeleton. "Rapid disappearance of the symptoms follows on proper drainage of the abscesses." He regards ligation of the pelvic veins as an operation on probation.

He specially recommends[12] hysterectomy with free vaginal drainage when the uterus is riddled with abscesses. As to that operation, he says (p. 906): "If we could tell when the infection is likely to pass the line of safety, we would know when to remove the uterus, and experience has shown that uteri are usually removed too late to do any good." He has never had any personal experience with the operation.

One of the leading opponents of the surgical treatment of puerperal infection is Prof. John G. Clark,[13] of Philadelphia, who distinctly advises the discarding of all such treatment in these cases. He does not say that he "puts these cases on the roof and forgets them," but he makes no classification of them and states that as "all roads lead to Rome," classification is unnecessary as there is no surgical treatment.

(Since Prof. Clark is from Philadelphia it might be well to bear in mind, incidentally, that when Oliver Wendell Holmes published his famous essay demonstrating the contagiousness of puerperal fever, he was most virulently attacked by Drs. Meigs and Hodge, of Philadelphia, who were professors of obstetrics respectively at Jefferson and the University, and that these same professors fought Sir James Y. Simpson in his advocacy of anesthesia in labor, saying "Pain in labor is a God given experience," and "To interfere with labor pains is flying in the face of Providence." We should also remember that Prof. Samuel D. Gross made vigorous opposition to Lister's advocacy of antiseptics, and that Prof. J. William White strongly opposed anything like routine surgical interference in appendicitis cases.)

In his book on Obstetrics, De Lee states that puerperal infection kills one in four hundred women delivered of full term children, and leaves as incurable invalids at least ten times this number.

Barton Cooke Hirst,[14] with a very large experience in puerperal infections, is a staunch advocate of surgery in cases requiring it. He says that the surgeon who operates must hold himself "in readiness to perform any of the pelvic or abdominal operations that may be found necessary when the abdominal cavity is exposed to view and to touch." Operative intervention is "demanded most frequently for localized suppurative peritonitis; * * * for suppurative salpingitis and ovaritis; for suppurative metritis, especially at the cornu * * *; for abscesses in the pelvic connective tissue; for infected abdominal or pelvic tumors."

Operation, he says, is not indicated simply because of symptoms, but because there is "some demonstrable evidence of intrapelvic or

abdominal inflammation, necrosis or suppuration. * * * If pus forms it must be reached and evacuated irrespective of its situation. * * * In favorable cases distinct signs of improvement manifest themselves in a few days, and the course of the disease is comparatively short. The mere protraction of septic symptoms is itself suspicious, *along with local signs of inflammation.*"[15]

* * * "It is a safe rule not to open the abdomen of a puerpera for sepsis unless there are physical signs of inflammation in the abdomen or the pelvis."[16]

Dr. Hirst advises that when infected pelvic tissues have to be incised "the cut edges of the broad ligaments should be allowed to gape; and the whole pelvic cavity should be filled with gauze" and drained by a glass tube at the lower angle of the incision. My technic differs from his only in covering the gauze with the sigmoid to protect the abdominal cavity, and in draining through the vagina. In speaking of infected and infiltrated broad ligaments, or foci of suppuration and infection in the uterine body, Dr. Hirst says. "The only hope for the patient in such cases lies in the entire removal of all infected areas. * * * There may also be such a widespread suppuration and disintegration of the broad ligaments, with tubal inflammation, that it is easier to remove all the infected area and to control hemorrhage by a hysterectomy. * * * There can be no doubt as to the necessity of hysterectomy in cases brought to the author's clinic every year and saved by this operation. Suppurative metritis, ulceration of the placental site, streptococcic necrosis of the myometrium, spontaneous rupture of the uterus followed by infection, necrotic fibroids are the conditions demanding hysterectomy."[17]

In a personal communication from Dr. Hirst, dated September 6th, 1922 (in response to his receipt of a report of my 67 cases and a preliminary sketch of my paper), he fully approves of the views expressed in the last edition of his work, stating that those views are the result of some thirty years of special experience in this sort of cases. Some ten years ago an assistant looked up the records and found that he had operated on a very large number of cases of puerperal infection of all sorts, and that number would be much larger if investigated at the present time.

He says: "The indifference to the operative treatment of cases in which operation is really indicated is due to the indisposition of most hospitals to admit such cases. I have a special department which is usually full of cases from the outside as it is known that I wish them for purposes of study and teaching. I entirely agree with the views you express and hope they will more generally prevail as I am sure they are correct. * * * The women you have operated upon I am convinced would have died without the operation. What chance have

streptococcic necrosis of the myometrium; cornual abscesses; intra-peritoneal suppuration, or pelvic abscesses?''

One of the most prominent surgeons in the East, to whom the cases and paper were submitted but who does not wish his name to be used, writes: "I have carefully read your paper and reports of cases and I am of the same opinion as yourself. Dilly-dallying, pussy-footing, and incompetency on the part of gynecologists are responsible for much.''

According to Jellett, of the Rotunda Lying-In Hospital. Sippel and others, the death rate without operation in the class of cases described in this paper is practically 100 per cent. In a large consultation practice I have seen many cases of puerperal infection. Most of them were cases of simple sapremia, many of which developed marked symptoms of infection with chills, fever and sweating, but with prompt recovery; though occasionally there developed a pelvic abscess, either in the culdesac or in the broad ligament, which required opening through the vagina. The others, however, with quite similar symptoms but with different pelvic conditions, invariably died of sepsis, usually after the lapse of several weeks. *In not a single instance of the serious type was there recovery.* During a surgical experience, the magnitude of which is indicated by carefully kept records of nearly 15,000 abdominal sections, and with histories of many thousands of patients upon whom no operations were made, I have many records of patients who recovered from simple puerperal infection, but *not a single one of recovery in which the history indicated an infection of the character discussed in this paper.*

The hopelessness of the type of infections in Class 5, has apparently always been recognized by experienced obstetricians and surgeons. Thus, a quarter of a century ago, Egbert H. Grandin and George W. Jarman[18] write as follows: "Unfortunately, septic metritis, salpingitis, and oophoritis, when developing during the puerperium, are of such a virulent type and the associated general systemic infection is so profound that we can expect but one result, no matter what the therapeusis, and this result is death. * * * There are now and then recorded cases where aggressive surgery has resulted in ultimate recovery. * * * The object of the operation being to remove from the body the source of the systemic infection, ablation of the involved organs must be thorough; that is to say, * * * the entire uterus with the appendages must be removed.''

It seems to me evident, therefore, that recoveries, if they ever occur, are so rare that every such patient who recovers after a surgical operation owes her recovery absolutely to that operation, and that no matter what the operative mortality may be. each such patient is

entitled to the benefit of operation if any competent operator is at hand.

The cases reported embrace all upon which I have operated. The original notes are much fuller in detail, but the salient points appear here with sufficient fulness. (The figures following the numbers refer to the full histories, which can be furnished to any one seeking complete details. The names of the attending physicians are omitted for manifest reasons, but the cases were referred to me by fifty-eight different physicians.)

During the past year, while preparing this paper, I have taken particular pains to discuss the subject with many physicians, individually and in groups as I meet them, and almost invariably I get reports of isolated cases of Class 5, but in all of them without exception a fatality ensued, barring one in which hysterectomy was done with complete recovery.

As my statistics show 47 recoveries out of 67 cases, I feel that there can be no question as to the propriety of operative intervention, or as to the great benefits to be expected from that intervention. My death rate could easily have been made better by refusing to operate on several of the worst cases, and yet one of the very worst, as indicated by her condition and history (No. 34), made a prompt recovery. That several of those that died would have recovered had there been earlier intervention, as in Nos. 3, 20, 58, etc., or had the operation been more radical, is self-evident.

If the operations advised by those who have merely ligated the thrombosed veins, with a mortality of 60 per cent, are justifiable, then certainly the more radical operation, usually for more serious conditions, with a mortality of less than 30 per cent, is beyond question advisable.

The technic used in all these cases, when not otherwise specified, consisted in making a panhysterectomy by the method described by me in a paper read before the American Association of Obstetricians and Gynecologists at Indianapolis, September, 1916.[19] The important features of that operation in this class of cases consist in:

(1) The patient should be placed as a rule in the Trendelenburg position, after thorough cleansing of the vagina and sterilizing of vagina and uterine cavity by injecting tincture of iodine. (2) Unusual care should be exercised after the abdomen is opened to build a coffer dam to protect the general abdominal cavity. (3) After the parts are sufficiently exposed the infected veins should be cut across, but *should not be ligated*, since absolutely free drainage is desired. (4) The arteries should be isolated and ligated as necessary, and catgut only should be used since silk ligatures become infected and might materially retard convalescence. (5) Where the culdesac is unusually

deep, the posterior vaginal wall should be split down so as to secure better drainage. (6) Attach the round ligaments to the vault of the vagina on each side so as to hold it up during the healing process. (7) Pass an iodoform gauze fluff down into the vagina, leaving most of the material to lightly fill the pelvis. (8) Over this swing around the sigmoid colon and attach it around the pelvic margin so as to make a complete floor of the abdomen and roof of the pelvis. In this way there is little risk of a general peritonitis, while the pelvic drainage is amply provided for, including the drainage into this gauze fluff, and then into the vagina, of the infected thrombosed veins. This gauze fluff is left in place for one week and then withdrawn. The open vagina gives ample drainage, and healing takes place rapidly. If, as was done in several cases, the uterus is not removed, the culdesac is widely opened into the vagina, the end of the gauze fluff introduced through that opening, and the rest of the technic as before.

Hysterectomy, under the conditions present in these infected cases, is not an operation for a tyro or for the operator whose abdominal work is practically limited to cesarean sections. The patient is in poor condition to withstand a prolonged operation and about thirty minutes should be the limit if satisfactory results are to be secured.

CONCLUSIONS

Without operative intervention, all of these patients die. In those rather rare cases in which the disease is practically limited to the ovarian veins, ligation of the veins above the thrombus is feasible, but the death rate, as shown by Miller, is not less than 60 per cent. Radical operation with free drainage of all the infected veins, and usually with hysterectomy, according to the results obtained in sixty-seven consecutive cases, gives a death rate of a little less than 30 per cent, or about one-half that of ligation, and that, too, in a more serious class of cases.

Puerperal infection, in brief, is simply wound infection, and should be treated on general surgical principles. The puerperal state confers no immunity but rather the reverse. All surgeons recognize the gravity of a neglected palmar abscess, or a wound received in operating or dissecting. Ear specialists long ago learned the vital importance of cleaning out, with ligation if necessary, the thrombosed internal jugular vein in case of lateral sinus infection due to disease of the mastoid; and there is certainly a striking similarity between an infected thrombus in the jugular and the same in the veins of the pelvis.

In all of these, and many similar, conditions what old Professor Joseph Pancoast used to call the "antiphlogistic touch of the therapeutic knife" is recognized as of absolute therapeutic importance.

REFERENCES

(1) *Polak, J. O.:* Pelvic Inflammation in Women, 1921, D. Appleton and Co., p. 79. (2) *Polak, J. O.:* loc. cit., p. 100. (3)*Miller, C. Jeff:* Surg., Gynec. and Obst., October, 1917, pp. 431-452. (4) *Cragin:* Practice of Obstetrics, 1916, Lea and Febiger, Philadelphia, p. 816. (5) *Murphy, John B.:* Surgical Clinics, i, 807, et. seq. (6) *Davis, E. P.:* Operative Obstetrics, 1912, W. B. Saunders Co., Philadelphia. p. 434. (7) *Jellett, Henry:* Manual of Midwifery, 1921, ed. 3, p. 965. (8) *Jewett, Charles:* Practice of Obstetrics, 1907, Lea and Febiger, Philadelphia, p. 647. (9) *Roos, T.:* Forschr. d. Med., 1921, xxxix, 708. (10) *Arnaudon, Marcel:* Surg., Gynec. and Obst., May, 1922, p. 363. (11) *De Lee:* Principles and Practice of Obstetrics, 1918, W. B. Saunders Co., Philadelphia, p. 868. (12) *De Lee:* Ibid, p. 887. (13) *Clark, John G.:* Ochsner's Surgical Diagnosis and Treatment, iii, 524. (14) *Hirst, Barton Cooke:* Text Book of Obstetrics, 1918, ed. 8, W. B. Saunders Co., Philadelphia, p. 679. (15) *Hirst, Barton Cooke:* Ibid, p. 680. (16) *Hirst, Barton Cooke:* Ibid, p. 681. (17) *Hirst, Barton Cooke:* Ibid, p. 684-5. (18) *Grandin, Egbert, H.,* and *Jarman, George W.:* Practical Obstetrics, ed. 2, F. A. Davis Co., Philadelphia, p. 440. (19) Am. Jour. Obst. and Dis. of Children, 1917, lxxv, No. 2.

115 SOUTH GRANT AVENUE.

[*The case reports which accompanied this paper, omitted on account of lack of space, may be found in the complete volume of the Society's Transactions for 1922.*]

GONOCOCCUS ARTHRITIS IN PREGNANCY*

BY GRANDISON D. ROYSTON, M.D., ST. LOUIS, MO.

GONOCOCCUS arthritis, it is stated, occurs in from 2 to 5 per cent of all cases of gonococcus infection and is regarded by Osler[1] as the most damaging, disabling and serious of all gonococcus complications. That this complication is less prevalent in the female is well illustrated by a series of 252 cases reported by Northrup,[2] in which 230 cases occurred in the male.

Norris[3] mentions that in a series of 50 cases at Johns Hopkins Hospital, only seven were in the female. It is rather a surprising fact that in the Gynecological Service at the Washington University Dispensary, I can recall no case of gonococcus arthritis in dispensary patients, nor has there been any gynecologic patient admitted to Barnes Hospital since 1914 to the present time, in whom there was present a complicating gonococcus arthritis, or one in whom such a lesion made its appearance during the course of the patient's hospital stay. Considering that there are numerous cases of acute, subacute and chronic gonococcus infections seen annually in these services, gonococcus arthritis is rather conspicuous by its absence.

Norris, in his elaborate monograph on gonorrhea in women, discusses systemic gonorrheal infection at considerable length. He describes gonococcus arthritis as merely a local manifestation of a general infection, the gonococcus being transmitted by the blood stream from the primary focus.

---

*Read at the Thirty-fifth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Albany, N. Y., September 19-21, 1922.

Lindèrmann,[4] in 1892, was the first to demonstrate gonococci in pure culture from a case of gonococcus arthritis and thus positively established the clinical existence of this condition. Gonococcus arthritis usually becomes manifest during the chronic stages of the original infection, usually from two to eight weeks after the onset of the initial infection, and attacks more than one joint in over two-thirds of the cases.

Thayer and Blumer,[5] in 1896, were first to demonstrate the gonococcus in the blood in a case of endocarditis during life, and at autopsy were able to demonstrate the gonococcus in the vegetations on the mitral valve. That the origin of the infection in their case was the uterus and the vagina was demonstrated by the presence of gonococci in smears from the vagina and uterus taken at autopsy. Norris states that since this report numerous observers have recovered organisms from the blood and gonococcus septicemia has been established as a clinical entity.

Norris[3] tells us that Lofaro, in studying the blood of 67 cases of genital gonorrhea was able to demonstrate the gonococcus in the blood of 39. Lofaro believes that it is only where extremely virulent bacteria are present, or where the soil is especially suitable, that the gonococcus can enter or thrive in the blood. The same investigator points out that a loss of continuity in the surface at the site of the original infection is a predisposing factor to gonococcus septicemia. He also feels that in many instances the gonococci have disappeared from the blood stream when the joint lesions develop.

That gonococcus arthritis occurs only rarely in pregnancy may be assumed because there is no particular detailed reference to such a complication in our modern textbooks. To my knowledge, no great number or series of cases of this character has been reported. This is all the more astonishing when one considers how frequently gonococci are found in the vagina of pregnant clinic patients, and also when we consider that the changes which occur in the vagina and cervix during pregnancy should be the most suitable for the growth of the gonococci and the spread of the infection.

In considering gonorrhea in pregnancy there is little or no mention of widespread infection occurring during this time. In the literature regarding the dangers of gonorrheal infection chief emphasis is laid upon the renewed activity at the time of labor with the resulting puerperal infection and the occurrence of ophthalmia neonatorum; further mention is made of the danger of the infection reaching the decidua during the early months of gestation, resulting in gonococcus deciduitis, which frequently causes the termination of the pregnancy.

Williams[6] states that the occurrence of gonorrhea during pregnancy should never be regarded lightly. He emphasizes the danger of the

infection during labor and the puerperium, and informs us that in rare instances widespread infection occurs, as the fatal cases of gonorrheal endocarditis observed in the Johns Hopkins Hospital and reported by Dabney and Harris[7] and J. T. Smith[8] illustrate. The case reported by Dabney and Harris is certainly a good example of a widespread gonorrheal infection during the puerperium. The patient was an unmarried girl, 19 years of age, who died about 24 hours after admission to the hospital, 26 days after a full-term delivery. The case was regarded as an ordinary puerperal infection, although intracellular diplococci were found in the uterine smear. The uterus was apparently well involuted and the adnexa were negative. The highest temperature was 103° F., and on auscultation over the apex of the heart, both sounds were replaced by murmurs. At autopsy the uterus was large, soft and somewhat congested, but there was no evidence of inflammation. Microscopically there was found considerable round-cell infiltration between the muscle bundles. Sections stained for bacteria were negative. There were present extensive vegetations on the aortic valve and also to some extent, on the tricuspid valve. Cultures from the vegetations yielded the gonococcus, streptococcus pyogenes and the bacillus coli communis. The tricuspid valve yielded no gonococci.

According to Lea,[9] Halle, Jardine and others have reported cases in which the gonococcus was found in pure culture in the puerperal uterus, in the joints and on the valvular vegetations in ulcerative endocarditis. When it is recalled that numerous observers conservatively estimate that the gonococcus is found in 5 to 10 per cent of the vaginae of puerperal women in hospital practice, and also that in the cases of puerperal infection various observers give the gonococcus as the cause of the infection in from 5 to 33 per cent of such instances, it is rather surprising that widespread virulent infections do not occur much more frequently at this particular time.

De Lee[10] states that in gonorrhea during pregnancy, due to the succulence of the tissue, the gonococcus attacks the vagina and vulvar epithelium in addition to the urethra, vulvar glands and cervix. The vagina is thick and granular like a nutmeg grater and bleeds easily on touch; the cervix is swollen, eroded and easily vulnerable. De Lee further states that acute gonorrhea in gestation can cause rheumatism, with disorganization of the joints of the wrist, knee, hip, etc., and even endocarditis and general septicemia.

Norris points out that pregnant women are more susceptible to gonorrheal infection than their nongravid sisters, because of the increased blood supply to the genital organs and the softening of these structures incident to gestation. Norris states that gonorrhea is extremly frequent in pregnancy. He quotes several observers who give

us information regarding the frequency of gonorrhea in the pregnant woman. Gurd[11] isolated gonococci from the vagina of 52 out of 113 pregnant women applying at a dispensary for treatment for pelvic pain. Leopold[12] contends that 20 per cent of pregnant women have gonorrhea. Stevenson[13] found 18.4 per cent infected, in a series of 1101 pregnant women. Sänger,[14] Burchardt[15] and Lomer[16] place the figure at between 15 and 30 per cent. Zwow[17] found the gonococcus in 75 out of 130 pregnant women. More recent observers, Taussig,[18] Harrar[19] and others, find gonococci present in 5 to 10 per cent of the cases. Recently I examined smears from 100 consecutive admissions in the prenatal dispensary and was able to demonstrate the gonococcus in only 3 cases. In view of the fact that from time to time serious widespread, systemic infections of gonorrheal origin occur during the puerperium, it is very important to be ever on the lookout for gonorrheal infections in the prenatal clinic. Many clinics, no doubt, take routine smears; judging from the high percentage of positive findings by many observers, such a procedure would seem necessary; yet it must be remembered that these reports were undoubtedly based upon a very closely observed series and not selected from ordinary routine work. We feel, therefore that a negative smear in a hurried routine course in a busy prenatal clinic gives one a false sense of security, and therefore, we have not adopted vaginal smears as a routine measure. We feel that patients presenting a local irritation, as well as any pathologic discharge, should be examined bacteriologically. Such patients should be treated irrespective of the bacterial findings, because it has been our definite experience that in many pregnant women exhibiting a marked purulent discharge, repeated examinations demonstrate no gonococci until after delivery. We further believe that the treatment in these cases should consist of some sort of an antiseptic douche, and that local treatments, such as are given in the nonpregnant state, should not be considered in these circumstances. We feel that in this way we have been giving the subject more individual attention and more effective treatment.

Among 4284 admissions on the obstetrical service of the Washington University Hospital and the Barnes Hospital, we have encountered four cases of gonococcus arthritis during pregnancy. One case developed during the puerperium. I feel that on account of the fact that apparently very few cases occurring during pregnancy have been called definitely to our attention, and also on account of the extensive involvements in these cases, the marked amount of discomfort and disability occasioned by the lesions, that they warrant serious consideration. Further, in one case there is rather definite evi-

dence that the disease was transmitted to the child in utero. This case is of unusual interest on account of this possible transmission.

The subject of transmissibility of substances through the placenta is perhaps no more elaborately discussed than in Williams'[6] textbook. He states that at present the consensus of opinion is that bacterial transmission occurs but rarely. He quotes from Lubarsch, 1896, that organisms of anthrax, pneumonia, typhoid fever and various infections due to pyogenic organisms may be occasionally transmitted but that such occurrences are very exceptional. Typhoid bacilli are transmitted to the fetus perhaps more frequently than any other organism. In this rather extensive review, no especial mention is made of gonococcus transmission, except the note that pyogenic organisms are occasionally transmissible.

The case observed in our series is very suggestive that this infection was transmitted through the placenta from the mother who, herself, had this widespread systemic infection, because five days after birth, with no evidence of any focus of infection, the child developed a marked swelling in both wrists and the left knee, from which two weeks later gonococci were isolated. Full details of this case will be given below and in connection with this entity may be mentioned the series of cases collected by Kimball,[20] in which he reports eight cases of arthritis and pyemia in infants ranging from two to three months of age. In these cases there was absolutely no evidence of any local manifestation of disease. Seven of these infants were males and one female. It is rather singular that in another series of 70 cases of marked vulvo-vaginitis in the same hospital, there was only one case with secondary joint involvement. He is at a loss to explain the mode of entrance of the organism in these cases. Three cases showed a mild stomatitis, from one of which a diplococcus was isolated; Kimball suggests this as a possible source of infection. The histories obtained in these cases give little or no information concerning the condition of the mother, either before or after labor. Kimball does not mention the possibility that these conditions may have been transmitted as a result of systemic infection of the mother.

CASE REPORTS

CASE No. 1.—M. B. Ob. No. 656. White. Age eighteen. Single. Gravid. 1. Admitted to the Washington University Hospital June 27, 1912. Pregnancy normal until the preceding day, when inflammation of the wrist, shoulder, knee and ankle joints, with slight swelling of the feet, were noticed by the patient. Expected date of term July 4, 1912. On admission, local examination showed a small cyst on the right labium majus and a peculiar eruption over the entire body suggestive of lues. Past history, uneventful, except that patient had noticed a profuse, creamy vaginal discharge beginning four months after the onset of pregnancy. Patient was delivered June 29, 1912, after labor of four hours' duration. July 5, knee was aspirated and the cloudy fluid thus obtained was cultured

and a pure culture of gonococcus was isolated. Wassermann, July 3, 1912, was negative. July 18, left elbow became involved. Sept. 13, left knee was ankylosed; slight flexion of left leg; left foot was swollen. Patient was discharged Nov. 18, 1912. The joints, especially the hands and knee, showed some fibrosis. Pelvic examination on discharge showed a firm outlet well contracted; cervix soft, admitting one finger, with triangular tear; uterus of normal size, in second degree movable retroversion. Slight induration on each side; no tenderness, no masses. After patient had been at home for 10 days, her hip and knee became painful. Six months later, she re-entered the hospital on the Orthopedic service where treatment was continued; later arthroplastic operations were performed on the wrist and knee joints. July 3, 1912, five days after birth, the infant's wrist and left knee began to swell. No local lesions were apparently observed in the child. On July 21, the infant's joints showed fluid for the first time. Aspiration revealed a fluid from which the gonococcus was isolated. On August 10, the right knee became involved and on Sept. 13, the left elbow. Later the child developed an ankylosis of the jaw and was under the care of the Pediatrics service intermittently for about 2 years.

CASE No. 2.—C. P. Ob. No. 2162. White. Age eighteen. Gravid. I. Patient was admitted to the medical service June 1, 1918. Two weeks previously she had had pain and swelling in her right elbow,—later, in wrist and shoulder; on third day in joints of left arm; fourth day in right knee and ankle. As soon as one joint became painful, pain in the previously involved joint would subside. Last menses about Dec. 1, 1917; term approximately Sept. 8, 1918. Wassermann, gonococcus and Tbc. fixation tests negative. Local examination July 20, 1918,—revealed the inner surface of the labium minus reddened, moist; mucopurulent vaginal discharge; urethral orifice reddened; urethra tender and on milking latter, a small amount of secretion was expressed; cervix long, soft, closed. Cervical smears showed many epithelial cells, some polynuclear leukocytes and many bacteria, among which were diplococci. The urethral smear showed many polynuclear leukocytes, some epithelial cells, many bacteria, and among them diplococci, possibly some of which were intracellular. July 29, 1918, patient delivered of a child weighing 2135 grams. Nov. 15, 1918, bimanual examination showed a mass in the right adnexal region which had previously been the size of a large peach, now the size of a small lemon, not tender. Uterus well involuted. No visible macroscopic evidence of gonococcus infection present. Smears from vagina, urethra and cervix, however, were definitely positive for gonococci. From the time of delivery until shortly before her discharge from the hospital, treatment for the involved joints was primarily dry heat and gonococcus vaccine.

CASE No. 3.—I. S. Ob. No. 2921. White. Married. Age twenty-three. Gravid. I. Patient admitted to hospital May 7, 1920, because of acute arthritis of right ankle, third right metacarpophalangeal joint, present since April 20, 1920, (17 days). Family history and past history both negative. Two weeks before onset of symptoms, patient contracted gonorrhea from husband, who was under treatment for an acute infection at the time. Macroscopic and microscopic examinations of genitalia were negative. There was one carious left upper wisdom tooth present. Nose and throat examinations, Wassermann and tuberculous complement-fixation tests were negative. Gonorrheal complement-fixation test positive, 1-plus. On May 13, 1920, 5 c.c. of purulent and bloody fluid was aspirated from the right ankle joint. Smears from this fluid showed fresh leukocytes, many of which contained gonococci. May 17, 1920, a fluctuating area appeared over the right lateral malleolus which was incised. May 18, 1920, the third right metacarpophalangeal joint became red, swollen and painful; pain appeared in the right shoulder. Patient was

given Neisser bacterin and the ankle was put in a cast. May 28, 1920, the membranes ruptured spontaneously, followed by a low forceps delivery 20 hours later. The child was breast-fed, gained nicely; had a nonspecific conjunctivitis from the third to the sixth day after birth. The patient was treated with the right hand in a splint, ice cap to the joint; most of the time the right ankle was in a cast, with short intervals of removal, the right foot being treated with applications of dry heat. Under this regime, the infected joints became less painful and the inflammation less marked. Pelvic examination six weeks postpartum revealed a well involuted uterus; no evidence of adnexal disease; no pathologic discharge; slight cervical tear with small adhesion between cervix and vaginal wall. March, 1922, patient reported for examination which revealed a normal pregnancy, without any evidence of gonococcus infection. Pregnancy to date (Sept. 18, 1922), uneventful, with date of expected delivery approximately Nov. 15, 1922.

CASE No. 4.—V. W. Ob. No. 4040. Colored. Age twenty-five. Gravid. IV. Last labor 2 years previously. Child died on fifth day, cause unknown. Patient applied at the obstetrical dispensary on Jan. 25, 1922, for prenatal care. Examination revealed an apparently normal pregnancy of 16 to 18 weeks. There was an erosion 2 cm. square on the posterior lip of the cervix and about the external os, and there was a history of bleeding after coitus. Although the patient said that she had had a vaginal discharge since the age of 15, there was no appreciable discharge present at this time and no smears were made for microscopic examination. Last menses appeared about the middle of Sept., 1921; date of term, latter half of June, 1922. Patient exhibited no abnormal symptoms during her monthly dispensary visits until April, 1922, when she complained of headaches and pain in her left shoulder which disappeared within a few days. On April 29, 1922, patient was visited in her home because of pain in her arms and legs elicited both on active and passive motion. Both wrists, right elbow, right metacarpophalangeal and right knee joints involved; also slight swelling of the dorsal surfaces of both wrists. Examination at this time revealed several carious teeth, acute pharyngitis and an erosion of the cervix uteri, with considerable mucopurulent discharge containing numerous gonococci. Two days later, the patient was brought into the hospital, suffering great pain in the involved joints. Past history, aside from the usual exanthemata of childhood which were free from complications, influenza four years before, and a vaginal discharge since the age of 15, patient had always been healthy. May 4, 1922, four c.c. of thick, turbid, light yellow fluid was aspirated from the right knee. Smears and cultures revealed no organisms. Wassermann negative. Gonococcus fixation-test positive, 2-plus.

June 4, 1922, child weighing 3390 grams delivered spontaneously; fed artificially without difficulty. Mother was treated with various gonococcus vaccines without any marked improvement. Joints were in splints during the acute stage. Dry heat, later, active motion applied to the joints after the acute symptoms had subsided. Pelvic examination at discharge showed the cervix closed, broad, soft; corpus well involuted, anteflexed, normal size, movable, not tender. Palpation in both adnexal regions elicited tenderness, no masses detected. Resistance of patient made examination somewhat unsatisfactory. Nothing found in pelvis at this time indicated an acute process.

July 26, 1922, patient was discharged from the orthopedic service because of leaving the city. At this time she was able to walk without support, though she stated that her right knee was still troublesome. Her right wrist had no perceptible motion; left wrist had fair motion which was increasing daily.

In going over these case records one is impressed, first of all, by the fact that the arthritis in all four cases came on in the latter half of pregnancy, and in three instances the first symptoms occurred after 35 weeks' gestation; and in two instances the patients were not observed previous to the onset of the arthritis, but in one instance the patient had been to the dispensary, being registered for a period of three months before the onset of the arthritic symptoms. No smears were made from this latter case previous to the development of the arthritis, apparently the condition having been overlooked. The third patient contracted her infection definitely between 32 and 35 weeks' gestation and had been perfectly normal up to that time. In only one instance was there any certain evidence of pelvic inflammatory disease present on discharge from the hospital. In every case, the puerperium was not in any way uneventful, aside from the arthritic involvement.

BIBLIOGRAPHY

(1) Osler, Wm.: Principles and Practice of Medicine. Ed. 8., p. 24. (2) Northrup, Finger and Bennecke, quoted by J. K. Young, Manual and Atlas of Orthopedic Surgery, Phila., 1905, p. 529. (3) Norris, Charles C.: Gonorrhoea in Women. W. B. Saunders Company, Phila. and London, 1913. (4) Beitr. z. Augenh., Hamburg and Leipzig, 1892, s. 31. (5) Bull. Johns Hopkins Hosp., 1896, vii, 57. (6) Williams, J. Whitridge: Textbook of Obstetrics, Ed. 4., D. Appleton & Co., New York and London. (7) Bull. Johns Hopkins Hosp., 1901, xii. (8) Cleveland Med. Jour., 1911, x, 810-818. (9) Lea, Arnold W. W.: Puerperal Infection, Oxford Univ. Press, London, 1910. (10) DeLee, Joseph B.: Principles and Practice of Obstetrics, W. B. Saunders Company, Philadelphia and London, 1913. (11) Montreal Med. Jour., 1908, xxxvii, 798. (12) Arch. f. Gynäk., 1863, xlvi, 667. (13) Stevenson, S.: Ophthalmia Neonatorum, London, 1907, p. 38. (14) Ztschr. f. Geburtsh. u. Gynäk., 1886, xi, 177. (15) Beitr. z. Geburtsh. u. Gynäk., 1889, xi, 2. (16) Ztschr. f. Geburtsh. u. Gynäk., 1884, x, 336. (17) Rev. gén. d'ophtalmologie, 1888, 28. (18) Am. Gynäk., 1903, xi, 334. (19) Bull. Lying-In Hosp., New York, March, 1911, p. 166. (20) Med. Rec., New York, Nov. 14, 1903.

RED DEGENERATION OF FIBROIDS

By John M. Maury, M.D., F.A.C.S., Memphis, Tenn.

ON APRIL 8, 1921, there was admitted to the Memphis General Hospital a negro woman twenty-nine years of age. She stated that she had been married twelve years and had never been pregnant until now; that menstruation had always been regular, lasting three days; that dysmenorrhea had always been severe and that her last menstruation had been from December 22 to 25, 1920. Her chief complaint was absence of menstruation for the preceding three months and the presence of a tender, painful mass in the lower abdomen.

About a month before, she had noticed a mass in the left iliac region which had increased somewhat in size and at times had given her a little pain. Three days before, the mass had suddenly become very painful and quite tender to touch and continued so until the time of the examination. Nausea and vomiting had been an occasional symptom for the past three weeks but had been worse since the onset of pain.

When examined the patient was sitting up in bed crying with pain in the abdomen. Her temperature was 101.8° F., pulse 108. Her general physical condition was negative except for the cardiac and lower abdominal region. The apex beat was in normal position, area of cardiac dulness normal and there was present at the base, but not transmitted, a systolic murmur. To sight, the abdomen contained a globular mass situated below and reaching up to the umbilicus. To touch, this mass was smooth and rather soft, and presented the usual characteristics of a four months' pregnant uterus. On the left side of the uterus there was a much harder, globular mass the size of one's fist and so tender that its examination was unsatisfactory.

Pelvic examination showed the usual softened and congested condition of the pelvic floor, vagina and cervix, incidental to pregnancy. The uterine body could be outlined reaching half way to the umbilicus. A globular mass the size of a large orange, firmer than the body of the uterus, could be felt on the left side in the region of the ovary. It could be readily distinguished from the uterine body and could be reached by the finger in the vagina, but was so tender that deep palpation was impossible and any possible connection with the uterus could not be determined. The urine was normal. Blood examination gave 3,200,000 red cells; 18,000 white cells; 75 per cent polys; 26 per cent lymphocytes; 85 per cent hemoglobin. Wassermann negative. The preoperative diagnosis was ovarian cyst with twisted pedicle, complicating normal pregnancy.

Operation.—Myomectomy. The usual median abdominal incision. Inspection and palpation revealed a fibroid tumor on the left antero-lateral aspect of a four months' pregnant uterus with the appendages normal. The tumor was the size of a grape fruit, intramural, without a pedicle and presented nothing abnormal in appearance. After gently lifting the uterus up into the incision, an elliptical incision was made in the uterine wall and the fibroid enucleated. The amount of bleeding was very much less than was expected from the raw surface, $3\frac{1}{2} \times 2\frac{3}{4}$ inches, in the uterine wall. The wound was easily closed with two layers of sutures. She was kept under the influence of morphine for five days and her recovery was uneventful. The temperature was normal on the third day and the leucocyte count down to 7500 with 68 per cent polys on the fourth day. Her physician writes that she had a normal delivery at term.

When cut open the tumor was rather dry, showing no evidence of edema or breaking down. In appearance the cut surface was mottled, a dirty white shading off in places to a bluish gray color. It emitted a meaty, offensive odor. Microscopically there were presented streaks of degeneration with cells in normal condition on both

sides. The degenerating areas presented the usual picture of broken down cells, deeply staining nuclei, etc., incidental to degeneration.

Postoperative Diagnosis.—Red degeneration in a fibroid complicating pregnancy.

ETIOLOGY

The cause of red degeneration is still a matter of speculation. Graves[1] and Lorraine Smith[2] describe it as either thrombotic or angiomatous while Bland-Sutton,[3] Lockyear[4] and Leith Murray regard it as a necrobiosis, the result of circulatory disturbances. Though it may be present as a secondary incident, microbic infection is not an etiological factor, as in most cases cultures were sterile. In the great majority of instances recorded the disease is associated with pregnancy, though Bland-Sutton[3] states that it is sometimes seen in spinsters near the menopause and Barbour[5] reports a case in a woman fifty-one years of age who had "but a short time before, ceased menstruating."

PATHOLOGY

While the disease is spoken of as red degeneration, the color of the cut surface may vary from bright red to brown, or have a greenish, bluish or dirty gray appearance. Murray regards the color as due to the hemolytic action of lipoids. In the case reported, the cut surface was dry and firm, grayish with bluish gray patches. It gave off an unpleasant odor which, according to Murray, is due to the presence of amines derived from disintegrating muscle fibers. Under the microscope, the broken down tissue cannot be distinguished from other forms of necrosis. There is the usual nonstaining cell fragments and deeply stained nuclei with areas of unstained cell detritus.

SYMPTOMS

The symptoms caused by red degeneration vary much in severity in different cases. It is probable that the condition may exist without symptoms. In others, there may be a little pain and tenderness which under appropriate treatment soon subsides; or there may be a condition of chronic toxemia and sapremia resulting from the absorption of amine-like bodies or poisons resulting from secondary saprophytic invasion. Again there are the fulminant cases resembling ruptured ectopic, acute appendicitis or torsion of a pedunculated tumor. In these cases, there is a sudden onset, acute pain, marked tenderness, rise of temperature, increased leucocytosis and vomiting. The case referred to, reported by Barbour,[5] was admitted to the hospital in extreme collapse.

TREATMENT

The mild cases, according to Bland-Sutton, will recover if put to bed and treated expectantly. The others must be given surgical treatment, either hysterectomy or myomectomy. Bland-Sutton[3] states that myomectomy during gestation results, in a majority of cases, in abortion. On the other hand, many cases of myomectomy on the pregnant uterus are reported with most satisfactory results. Guggisberg[6] reports seven such cases in his practice, all of which recovered, and in the same article quotes Ihm's 18 cases with 15 recoveries. We fully agree with Schiller,[7] who reports one myomectomy with recovery, that "whether myomectomy or hysterectomy shall be done depends upon the surgeon and the conditions present." The points of interest in the case are:

1. The patient became pregnant for the first time after twelve years of married life.

2. The onset of symptoms was so sudden and violent that it was thought by the hospital interne that she might have a ruptured ectopic pregnancy.

3. The sudden onset of pain followed by tenderness, increase in size of the tumor, leucocytosis, relative increase of polys and rise of temperature simulated to a marked degree the symptom-complex of a cyst with twisted pedicle.

4. Red degeneration of a fibroid associated with pregnancy may bring about the clinical picture of an "acute abdomen."

5. The immediate cessation of temperature and drop in the cell count after removal of the tumor.

6. Recovery after myomectomy, without interruption of the associated pregnancy.

BIBLIOGRAPHY

(1) *Graves:* Gynecology. (2) *Smith, Lorraine:* Jour. Obst. and Gynec., Brit. Emp., March, 1913. (3) *Bland-Sutton, Sir J.:* Brit. Jour. Med., July 29, 1916. (4) *Lockyear, Cuthbert:* Multiple Myomectomy in Sixth Month of Pregnancy. Labor at Term, Proc. Royal Soc. Med., Gynec. Sec., March 5, 1914. (5) *Barbour, H. A. F.:* Trans. Edinb. Obst. Soc., xxxvii, 202. (6) *Guggisberg:* Abst. Jour. Am. Med. Assn., June 11, 1921, lxxvi, 1713. (7) *Schiller:* Am. Jour. Obst. and Dis. Women and Child., October, 1918, lxxviii, 519.

720 BANK OF COMMERCE BUILDING.

SARCOMA OF THE UTERUS, WITH A REPORT OF THIRTY CASES

By Marnetta E. Vogt, M.D., Philadelphia, Pa.

AS THE result of an investigation conducted in the Gynecologic Laboratory of the University of Pennsylvania, and from the finding of a report on "The Microscopic as Compared with the Clinical Diagnosis of Malignant Uterine Neoplasms," the following data on sarcoma of the uterus were secured:

ETIOLOGY AND FREQUENCY

Sarcoma of the uterus, as compared with uterine carcinoma, is a rare disease. Its origin is still undetermined. Over a period of time in which a series of 1216 fibromyomata were subjected to histologic examination, but 30 cases of sarcoma were found, thus showing the infrequency of this type of malignant neoplasm. Of the 30 sarcomatous growths, only 8, or 0.6 per cent, could be traced to a previously existing benign neoplasm.

The cases reported in the literature bear out in some respects these findings, as may be seen from Table I.

TABLE I

MYOMATA EXAMINED	TOTAL NUMBER	SARCOMATA NUMBER	%
Evans[1]	4000	72	1.8
Kelly and Cullen[2]	1400	17	1.2
Berreiter[3]	716	6	.83
Williams[4]	4115	8	.19
Tracy[5]	3561	54	1.5
Gurlt[6]	4115	8	1.8
Noble[7]	2274	34	1.4
Von Franque[8]	3366	16	.47
Gessner[9]	9133	18	.19
Veit[10]	42,395	40	.09
University of Pennsylvania	1216	30	2.37
	72,116	300	4.1

In the foregoing series Kelly and Cullen[2] found 12 cases that were positively diagnosed as sarcoma, whereas in 17 more examined by the same observers the growth was regarded as suspicious.

In 1898 J. W. Williams,[11] in an exhaustive review of the literature, found only 144 authentic cases of sarcoma of the uterus on record. Since that time reports of approximately 500 additional specimens of uterine sarcoma have been recorded.

The relative frequency of sarcoma to carcinoma varies somewhat in different clinics, as may be seen from a study of Table II.

TABLE II

PROPORTION OF SARCOMA		TO CARCINOMA	%
Evans[1]	1	40	2.5
Frank[12]	1	30 or 40	3.3
Geisler[13]	1	50	2.0
Veit[10]	1	37	2.7
Krukenberg[14]	1	47.5	2.1
Von Franque[8]	1	20	5.0
University of Pennsylvania	1	34.7	2.9
	7	319.2	2.1

The discrepancy in the findings of various authors is probably due, as Frank[12] suggests, to the differences in pathologists' interpretations of the histologic findings in either doubtful or early cases.

Sarcoma of the uterus occurs most frequently in middle life. One exception to this general rule is found in sarcoma botyroides, the grape-like type of sarcoma which is practically always observed in young children (McFarland[17]). This is a relatively rare form of new-growth and no incidence was found among the 30 cases under discussion.

The age variations in this series of sarcomata of the uterus were as shown in Table III.

TABLE III

20—30 years	3 cases	10%
30—40 "	2 "	6.6%
40—50 "	12 "	40%
50—60 "	10 "	33%
60—70 "	3 "	10%

Williams,[4] in a study of 2649 uterine neoplasms, found one case under twenty; and the greatest number—five—were between thirty and forty years of age. In Gusserow's[15] series of 73 cases 28 were found to be between forty and fifty years of age, and in an analysis of 463 cases collected from the literature, Meyer[16] found 85 between forty and fifty.

The percentage of nulliparous as compared with multiparous cases is incomplete in the literature. In the series here presented there was an average of 36 per cent of nulliparous cases, whereas Veit's[10] proportion was 25 per cent.

SITE

Of the 30 cases studied, only two incidences of sarcoma of the cervix were found, whereas 28 were of corporeal origin, a ratio of 1 to 14. Table IV presents an analysis of 439 cases obtained from the literature.

Insofar as it was possible to designate the proportion of intramural, submucous, and subperitoneal sarcomata, the findings were as follows:

TABLE IV

	TOTAL NUMBER	CORPOREAL ORIGIN	CERVICAL	PROPORTION
University of Pennsylvania	30	28	2	14:1
Krukenberg[14]	16	11	5	11:5
Piquand[18]	393	325	68	4:1
Gessner[9]*				8:1
Meyer[14]*				29:1

*Only proportion obtainable in Gessner and Meyer's cases.

University of Pennsylvania, 15:5:10. Kelly and Cullen's analysis of 17 cases showed a proportion of 9:3:5, whereas Piquand's[18] 168 cases were proportionately 60:63:45. In a review of the 30 cases presented it was observed that the majority were of a diffuse rather than a circumscribed type of growth. Wide extension and metastases were found in only four cases at the primary operation.

PATHOLOGY

It is generally conceded that uterine sarcomata are myogenic in origin, Ewing,[19] Meyer,[16] Frank,[12] Cullen,[2] with wide variations in the neoplastic smooth muscle tissue. There is usually insufficient tissue of fibroblastic type that can be recognized definitely as of uterine origin. Moreover, the suspicious changes may not always be progressive, but may be merely a local or temporary acceleration of growth, that may subside or even retrogress. As further evidence of the rarity of sarcomatous development within the uterus may be mentioned the fact that Ewing[19] has seen only three cases with generalized metastases in twenty years and two cases with local recurrences.

In the series of 30 cases here studied, the frequency of the different types of sarcomata, as compared with the cases of other investigators, was as follows:

TABLE V

TYPE	PIQUAND	GEIST	EVANS	UNIVERSITY OF PENNSYLVANIA	PERCENTAGE
Spindle Celled	42	11	32	9	30%
Mixed Celled	34	9	22	10	33.3
Small Round Celled	26	2	6	4	20.0
Large Round Celled				6	13.3
Endothelioma				1	3.3

A comparison of these figures shows quite definitely the predominance of the spindle-celled type of sarcoma. Histologically, numerous giant cells and mitotic figures, both typical and atypical, were found in every specimen examined, with a noticeable inequality in the size of the tumor cells in the most advanced cases. Early or late destruction of the blood vessel walls was a characteristic feature. As in Evans' analyses, the most malignant tumors presented masses of closely packed cells of large size. On macroscopic examination the

specimens were seen to be characterized by a delimitation of the tumor in the early cases, or by widespread destruction and necrosis in the advanced. When the sarcoma was associated with a fibromyoma, the specimen presented a pinkish white or a grayish yellow tinge, whereas in those of fixed type a yellowish tinge was the predominating feature. The usual coarse fibrous arrangement of the tissues was replaced by more homogeneous elements, with a smoother, infiltrative base. Secondary pathologic changes, such as edema, cyst formation, necrosis, and sloughing, were noted in approximately 25 per cent of the specimens sent to the laboratory. Extension to the bladder was noted in one case and to the ovaries in two cases, both of the latter showing a bilateral involvement.

Hyaline degeneration was so frequent in sarcoma associated with myomata that one is led to believe this to be a degeneration coincident to the sarcoma rather than a progressive malignant change. Two specimens associated with myomata presented a calcareous degeneration in nodules other than those of the sarcoma. Approximately 50 per cent of the series analyzed showed associated inflammatory lesions of one or both adnexa, such as purulent salpingo-oophoritis, chronic inflammation, or small cystic degenerations of the ovaries. Extensive abdominal metastases were present in but a small percentage of all the cases examined and pulmonary metastases were not observed in any at the time of operation.

Clinically, the diagnosis is often made only with extreme difficulty. In this series the majority of patients presented themselves for examination at the climacteric, with confusing symptoms referable to a fibromyoma, anemia, irregular bleeding at the menopause, or cachexia. Among the 30 patients forming the basis for this study, 10 were found to be in the early stage of the disease, 12 moderately advanced, and 8 patients presented extensive involvement. From these figures alone, one may see how hopeless, from an operator's viewpoint, many of these cases are. A positive clinical diagnosis was made in only 8 cases, although the correct diagnosis was suspected in 8 more. The clinical findings were not only instructive, but valuable, since 19 cases that were diagnosed as benign, proved on histologic examination to be malignant. Of the 30 cases in the series, 17 were diagnosed as uncomplicated myomata. One was classified as an ovarian cyst, one as endometritis, another as pelvic inflammatory disease, and 3 were believed to be carcinoma of the uterus. In almost 37 per cent of the cases malignancy was entirely unsuspected.

The results of this analysis should emphasize the extreme value and necessity of making an accurate diagnosis based on thorough pelvic examinations, noting any palpable differences from the usual findings of a fibromyoma. Although in many types of tumors the
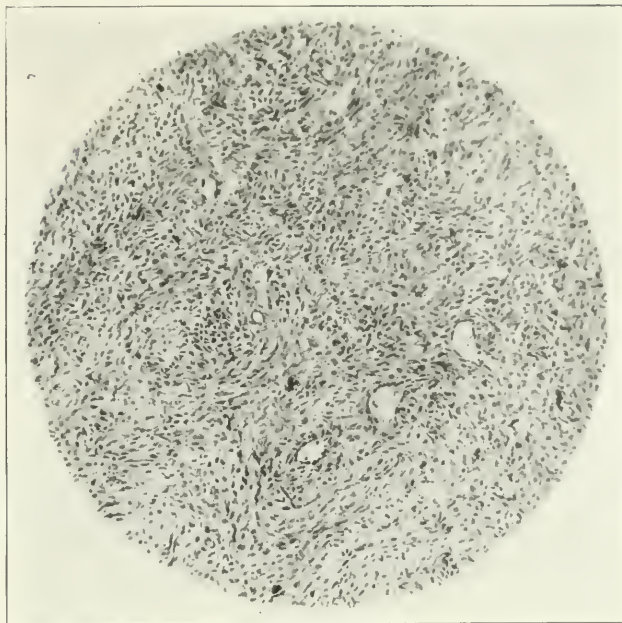
Fig. 1.—Small round-cell sarcoma.
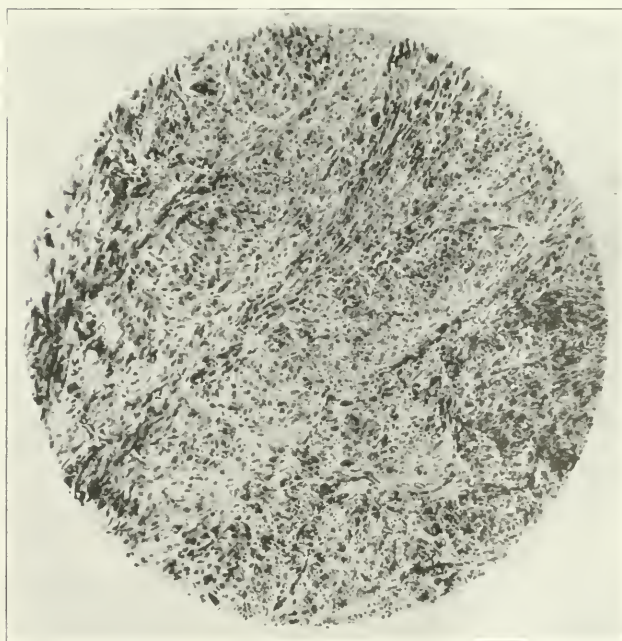
Fig. 2.—Mixed cell sarcoma.

evidence secured by a diagnostic curettage is not reliable, its value should not be underrated, and every myoma should be subjected to histologic examination. Rapid growth of a suspected myoma should always be regarded with suspicion.

TREATMENT

The treatment must necessarily vary according to the stage of the tumor, the type of neoplasm, and the parts involved. Of the 30 cases analyzed, in 24 radical operative measures were undertaken, whereas in 6 cases palliative treatment alone was employed. Three of the more recent cases were treated with radium, two of the three receiving this treatment about six weeks prior to the radical operative procedure.

As a further proof of the rarity of myomatous growths developing into sarcoma, Clark and Keene[20] in a study of the end results of 527 myomata, all of which had been followed over a prolonged period of time, and all of which had been treated by radium, did not encounter one case of malignant degeneration.

RESULTS

As regards results the statistics in the literature are both scanty and incomplete. Of the 30 cases reported here, two are on record as having had no recurrence to date. One remained well for seventeen years after her primary operation, and was treated with radium three years subsequently. At this time she noticed a small amount of bleeding. The tissue removed from the cervical stump was diagnosed as malignant, and she received 75 milligrams of radium for twenty-four hours, or a total dosage of 1800 milligram-hours. The second case has remained well for two years, showing no symptoms of recurrence since the primary radical operation. On histologic examination the first of these two cases presented a small round-cell sarcoma (Fig. 1), whereas the other showed a mixed-cell type of tumor growth (Fig. 2). Both were nullipara. As replies and information were received in only 16 cases, or 50.3 per cent of the 30 analyzed, the cures approximate 12.5 per cent and the mortality 87.5 per cent. The rapidity of recurrences and the fatality of this disease can best be judged by a study of Table VI.

From Table VI the average time of recurrence can be seen to be

TABLE VI

	2 WEEKS	3 MONTHS	6 MONTHS	1 YEAR	2 YEARS
Recurrences with death	1	2	3	6	2
					Total 14
No recurrences	2 years 1		17 years 1		
					Total 2

from six months to one year. In only two cases studied were local recurrences noted prior to death, generalized metastases being the most common cause.

CONCLUSIONS

1. Sarcoma of the uterus is a relatively rare neoplastic disease.

2. Sarcomatous degeneration of myoma of the uterus was traceable in only 8 cases out of 30 here studied or 0.6 of 1 per cent.

3. The proportion of sarcomatous degeneration to carcinomatous degeneration of the uterus is between 1:30 and 1:40.

4. Sarcoma of the uterus is a disease of middle life—more especially of the climacteric.

5. In the series under discussion sarcoma was 14 times more common in the body than in the cervix of the uterus. The intramural was the type most often encountered, whereas the submucous, subperitoneal, and intraligamentous varieties were less frequent.

6. The mixed-cell type of sarcoma was the most frequent histologic finding in the proportion of 33.3 per cent.

7. The importance and value of the diagnostic curettage, particularly in neoplasms of the submucous type, and the histologic examination of all myomata is emphasized.

8. Emphasis is also laid upon the fact that with the original diagnosis of myoma, in 37 per cent of the total number of cases, malignancy was unsuspected until the specimens were examined histologically in the laboratory.

9. Sarcoma of the uterus generally produces early and extensive metastases, although in the cases presented metastases were not marked at the time of operation. The number of three-year cures in this series of cases averaged 12.5 per cent.

10. Radical operative procedures plus treatment with radium offer the greatest hope for cure.

REFERENCES

(1) *Evans:* Surg., Gynec. and Obst., 1920, xxx. 225. (2) *Kelly and Cullen:* Myomata of the Uterus, Saunders, 1909. (3) *Berreiter:* Zentralb. f. Gynäk., 1921, xlv, 1592. (4) *Williams, W. R.:* Uterine Tumors, 1901. (5) *Tracy O. E.:* Surg., Gynec. and Obst., vi, No. 3, p. 246. (6) *Gurlt, E.:* Berlin, Hirschwald, 1879, lxx. (7) *Noble, C. P.:* Jour. Am. Med. Assn., 1906, xlvii, 1881-1886. (8) *Von Franque:* Centralbl. f. Gynäk., 1893, Zent. Gyn. 9.40. (9) *Gessner:* Veit's Hand. f. Gynäk., ed. 1, Sarkoma Uteri. (10) *Veit, J.:* Handbuch d. Gynäk., 1.c.32-31:516. (11) *Williams, J. W.:* Am. Jour. Obst., 1894, xxix, No. 6. (12) *Frank, R. T.:* Gynec. and Obst., Monographs, Appleton Co., 1921. (13) *Geisler:* Breslau—Quoted from Lynch—Gynec. and Obst. Monographs, Appleton Co., 1921. (14) *Krukenberg:* Archives d. Gynäk., p. 50. (15) *Gusserow, A.:* Cyc. Obst. and Gynec., v, 9, 1887. (16) *Meyer, R.:* Monats. f. Geburtsh. u. Gynäk., 1911, xxxiii, 701, Sarcoma Uteri, Veit's Handbuch, 1.c.32-3, 1:447. (17) *McFarland, J.:* Am. Jour. Med. Sc., April, 1911, cxli. (18) *Piquand:* Le degenerescences de fibrom de l' uteris, Thèse de Paris, 1905. (19) *Ewing, J.:* Neoplastic Diseases, W. B. Saunders Co., 1919. (20) *Clark and Keene:* Jour. Am. Med. Assn., Aug. 12, 1922, p. 546.

107 SOUTH TWENTY-FIRST STREET.

HERNIA OF THE FEMALE INTERNAL GENITALIA THROUGH THE INGUINAL CANAL*

By H. W. Hewitt, M.D., Detroit, Mich.

HERNIA of the female genitalia through the inguinal canal is of relatively rare occurrence, yet it is of sufficient practical importance to justify consideration at this time. In 1905 and 1906 Frank T. Andrews,[1] in three exhaustive articles, tabulated all recorded cases to that date, the tabulation being as follows: hernia of the tube, 46 cases; hernia of the ovary and tube, 82 cases; hernia of the ovary, 167 cases; hernia of the uterus (gravid and nongravid), 76 cases. Total, 371 cases. In 1907 Carstens[2] reported two cases of his own and collected 8 additional cases, classified in the following manner: hernia of the ovary and tube, 4 cases; hernia of the ovary, 5 cases; hernia of the uterus, 1 case. In 1912 Heinick[3] reported three cases of his own and collected 12 other cases as follows: hernia of the ovary, 2 cases; hernia of the ovary and tube, 12 cases; hernia of the uterus, 1 case. In 1913 Farrar[4] added three additional cases of hernia of the uterus. Since 1913 the writer has been able to find 10 authentic cases, as follows: hernia of the tubes and ovaries, 5 cases, Rabinowitz,[5] Müller,[6] Daniels,[2] McClanahan,[8] Royster;[9] of the uterus, tubes and ovaries, 4 cases, Priami,[10] Santoro,[11] Barr.[12] Ludington;[13] of the tube alone, one case, Guiliano.[11] These, with the author's case, bring the total of recorded cases to 411.

The writer desires to place upon record the following case: Mrs. S., aged forty-nine years, Lithuanian, married twenty-seven years, mother of nine children. Menstrual periods regular until six months ago, since which time the flow has been irregular and profuse. Her labors were short, averaging one hour. Delivery normal in each instance. With the exception of an occasional headache, her past history has been negative. History of present illness dates from 16 years ago, when she gave birth to a baby girl. Immediately following this delivery she was seized with severe pain in the left lower quadrant of the abdomen and noticed a small protrusion in the left inguinal region about the size of a hen's egg. This could be returned with ease, at times disappeared entirely, and caused her no pain or discomfort during the following fourteen years. Two years ago she was seized with pain in the left lower quadrant of the abdomen, which lasted for two weeks. This confined her to her bed at that time. She also noticed that the growth was increasing in size, assuming that of a large orange. Later it was determined that this increase in size was due to pregnancy. After labor the protrusion in the inguinal area persisted and gradually increased in size until operation. She states that it caused her no disturbance, with the exception of a sensation of traction in the region of the tumor. Operation was performed April 18, 1921. A tumor the

size of a small fetal head was present in the left inguinolabial region. There appeared to be fluid in the tumor, so the preoperative diagnosis was hernia of an ovarian cystoma. An incision was made over the inguinal canal extending downward onto the labium majus. On opening the sac what appeared to be a thick walled ovarian cyst presented. Removal of the cyst without disturbing the fluid was attempted, but because of firm adhesions to the uterus, was abandoned. After the fluid was evacuated, an effort was made to remove the cyst but adhesions to the uterus were so firm, with no visible or palpable line of cleavage, that the best course seemed to be the removal of the uterus also. This was done, herniotomy performed and the patient made an uneventful recovery. A note from her physician dated September 1, 1922, states that she feels well, has a good result from her herniotomy and is entirely relieved of all her symptoms.

Fig. 1.—Female internal genitalia removed from a hernia of the inguinal canal.

A description of the specimen by Dr. Clarence Owen, pathologist to Grace Hospital, follows:

The specimen consists of uterus, adnexa and a cavity, the latter placed with its floor on the fundus of the uterus (Fig. 1). The entire specimen is conical in shape, with the apex at the cervix. From the base to apex measures 19 cm. The base measures 8 cm. The uterus and cervix are considerably enlarged. The body of the uterus measures 7 cm. from the fundus to internal os, and 1 cm. in its greatest diameter. The wall is 3 to 4 cm. in thickness. The cervix is 4 cm. long and from 1 to 3.5 cm. in transverse diameter. The cavity of the uterus is practically obliterated. The fallopian tubes are both enlarged, tortuous, and embedded in a dense mass of fibrous tissue: the left is 9 cm. long, the right 6. Both end in fimbriated extremities, which are in apposition to their respective ovaries. The ovaries are

likewise embedded in fibrous tissue, are recognized only on microscopic examination and measure 1.5 to 2 cm. in diameter. The right ovary contains what appears to be a corpus hemorrhagicum about 0.75 cm. in diameter. The lumina of the tubes were not traced, it being impossible to pass a probe. Sections were made at different portions of the tube, the lumen found to be from .5 to 1.5 mm. in diameter. The diameter of the tubes varies from 1 to 2 cm. The tubes blended insensibly into fibrous tissue involving the ovaries and the cavity. The cavity above mentioned is spherical in outline, from 7 to 8 cm. in diameter. The floor is formed by the fundus of the uterus and portions of the tubes, the ovaries and a fibrous tissue wall. This fibrous tissue wall is from 5 to 8 mm. in thickness. On the external surface of the wall, superiorly and posteriorly, there is a covering of peritoneum. The cavity is lined throughout with dark brown pigmented substance from 0.5 to 1 mm. in thickness.

Microscopical Findings.—Cervix: There is marked glandular hyperplasia of the cervical mucosa, the wall of the cervix being markedly fibrosed, with areas of small, round infiltration. Considerable hypertrophy of the uterine mucosa is found with a concomitant hyperplasia of the glands. The walls of the uterus are thickened with fibrous change and numerous areas of round-celled infiltration are noted. Fallopian Tubes: A small amount of transverse and longitudinal muscular wall remain embedded in a mass of chronic granulation tissue. The plicae of the mucosa are obliterated and all that remains of the mucosa is a layer of simple columnar epithelium. The mucosa is separated from the muscular wall by chronic granulation tissue, about 2 mm. in thickness. The latter is composed of old fibrous tissue with many blood vessels, and numerous areas of small round cells, a few eosinophiles and occasionally a group of cells containing large mononuclear wandering cells. The ovaries are senile in type, containing several corpora albicantia. The stroma is atrophic and there is a marked fibrosis with chronic granulation tissue. In the right ovary, an encapsulated area of hemorrhage is seen about 1 cm. in diameter, surrounded by a distinct fibrous tissue capsule. This in the gross appearance resembles a corpus hemorrhagicum and granulation tissue in which the tubes are embedded. The lining of the cavity has a layer of old hemorrhage. The cellular infiltration is abundant, consisting of plasma cells, small red cells, and eosinophiles showing some tendency to localization around the vessels.

Etiology.—It has been stated that every organ within the abdomen, with the exception of the liver and the pancreas, has at one time or other been found in the sac of an inguinal hernia. If the ligamentary supports of the uterus, tubes and ovaries are sufficiently lax, one of the factors in the etiology of inguinal hernia is present, the other factors being a patulous inguinal canal and intraabdominal pressure. Let us consider for a moment one of these factors, viz: the patent inguinal canal. There is still some disagreement as to whether or not the canal of Nuck is analogous to the processes vaginalis in the male. Carmichael[15] considers this doubtful. Others believe the analogy to be true. At all events persistence of the canal of Nuck has been shown to be an important factor in the etiology of this form of hernia in women. In the third month of fetal life, the ovary passes from its position below the kidney downward into the pelvis. In 75 per cent of children, the canal of Nuck is obliterated at birth. Carmichael believes that persistence of this process of peritoneum

is associated with malposition of the ovary in 30 per cent of cases. Imperfect development of the ovary, tube or uterus is frequently associated with inguinal hernia and is looked upon by some writers as an important etiologic factor. In fact not a few of the herniated ovaries in young girls have been found by microscopic examination to be not ovaries but immature testicles. In the androgynous type of hermaphroditism, inguinal hernia is frequently present and the sac has been found to contain female genital organs in a number of instances. Corner made a study of inguinal hernia in female children and makes the observation that "irreducible hernia in female children is almost sure to contain some of the internal genitalia, while in the adult, though it may be present, it is very unlikely to be." The ovary and tube do not, as a rule, lie free in the sac but are adherent or are intimately associated with the sac, giving further confirmation to the theory of congenital origin of these herniae. Andrews[1] states, "that imperfect development of the uterus is likely to be associated with a congenitally open inguinal canal" and "nearly all, if not all, of the inguinal herniae of the uterus have some congenital defect as the primary cause."

Inguinal hernia is five or six times less frequent in the female than in the male. Royster[18] gives the following reasons for this: 1. Women are less given to hard straining labor. 2. The canal of Nuck is smaller and the round ligament less bulky than the corresponding structures in the male. 3. The internal oblique occupies a lower position and this protects to a greater extent the internal ring. 4. The internal ring occupies a higher position than in the male. Coley[19] collected a series of 59,404 cases of inguinal hernia, 9082 occurring in the female. From the Mayo Clinic Judd (quoted by Coley) reports in a series of 1429 cases, 119 females. Direct inguinal hernia in the female is rare. In Coley's[19] series of 353, only two were direct, (about 0.6 per cent) while in 1775 cases in the male, fifty cases were direct, or about 3 per cent. Hernia of the tube, without the ovary or uterus, comprises 10 per cent of the cases; hernia of the ovary 50 per cent; ovary and tube 20 per cent; the nongravid uterus 12 per cent; the gravid uterus 8 per cent. In hernia of the uterus, the ovary and tube of one side are usually carried down into the sac. Hernia of the tube alone is not infrequently brought about by an hydatid of Morgagni, first getting into the sac and bringing the tube after it. Bilateral hernia of the ovaries and tubes has been found simultaneously in the same individual. Carmichael[15] has cited thirteen such cases, and states that: "This tendency seems to be more marked the younger the subject." Cases have been reported where the ovary and tube of one side have been diagnosed and removed only to be followed by hernia of the other tube and ovary on the

opposite side. Farrar[4] mentions a case of bilateral inguinal hernia of a bicornuate uterus, one horn in each sac. Further, as Andrews points out, by adhesion to intestine or omentum the pelvic organs may be fixed in a position favoring entrance into a preexisting sac. The genital organs do not necessarily lose their functional activity by hernial displacement so that menstruation may continue with more or less regularity. Pregnancy has not infrequently taken place in a herniated uterus, as Andrews cites thirty such cases. When, however, the ovary is herniated before puberty and is irreducible, full maturation and development are not likely to occur. Further, the mobility of the ovary leads to torsion of its stalk with consequent interference with venous return, and attacks of congestion which may destroy the ovary entirely. Hernia of the ectopic tube occurs only occasionally. In Andrews' series of 371 cases, this was noted only five times.

Pathology.—The genitalia in the sac may be normal except as to position. In irreducible ovarian hernia in children, changes take place in the ovary due to pressure or to torsion of the mesoovarium, resulting in serious injury to the ovary, as stated above. Adhesions, strangulation, inflammation, infection, tumor, pregnancy, either tubal or uterine, may be encountered.

Symptoms.—In the simpler forms these are no different from those seen in the intestinal or omental types. In the complicated types, the symptoms may vary from mild discomfort to a distress very much pronounced. The symptoms will depend upon the age of the patient, the genital organs involved, the type of hernia, whether simple, irreducible, incarcerated, or strangulated, and malformations, adhesions, infections, tumors, or the presence of other organs in the sac.

Diagnosis.—This form of hernia is rarely encountered, hence is unsuspected and frequently not diagnosed until operation. As Lejars[20] states: "These hernias are almost always surprises." Hernia of the ovary in young children should not be difficult of diagnosis, for as Corner remarks, the diagnosis is more than suggested by the fact that these forms of hernia are usually irreducible and when irreducible the ovary and tube may be easily felt. When the hernia is strangulated and shows no impulse on crying, the diagnosis is easily made by the nontranslucence of the swelling and the absence of symptoms of bowel obstruction. Hernia in the adult female is usually acquired, although a patulous canal of Nuck is present in nearly every case. In the adult female, the diagnosis presents greater difficulties, especially in cases where a small ovarian cystoma is present in the sac, which latter may be readily mistaken for hydrocele of the cord. Hernia of the tube alone is very difficult to make out, but hernia of the uterus is comparatively easy. The hard uterine tumor in the inguinal region

and inability to palpate the uterus in its usual location should be sufficient to make one suspicious of the condition present. Differential diagnosis must be made from hydrocele of the canal of Nuck, epiplocele, small intestinal hernia, tumors in the sac, as fibromata, lipomata, carcinomata, etc., and especially tumors of the round ligaments; also from femoral hernia and undescended testicle in hermaphrodites. Treatment will depend upon the age of the patient, the organ herniated, the type of hernia whether (a) reducible, (b) irreducible, (c) incarcerated, or (d) strangulated, the contents of the sac and the complications present.

In hernia of the ovary and tube, when these are reducible and normal, they, of course, should be saved; if pathologic, removal should be practiced. If the hernia is irreducible the ovary should be preserved, provided it is normal and may be replaced without injury to its blood supply or without in any way weakening the herniotomy. In hernia of the uterus, between puberty and the menopause, this organ should be preserved unless there appears to be some very good reason for its removal, while in patients at the menopause the best procedure is to remove the herniated organs. When hernia is incarcerated, or strangulated, extirpation is necessary. These cases are but rarely encountered and the effort to make an accurate diagnosis will not infrequently put to the severest test the ability of the most skilled gynecologist.

REFERENCES

(1) ªAndrews: Trans. Am. Gyn. Soc., 1906, 407. ᵇAndrews: Jour. Am. Med. Assn., xlv, 1905, 1625. ᶜAndrews: Jour. Am. Med. Assn., xlvii, 1906, 1707. (2) Carstens: Jour. Am. Med. Assn., xlix, 1907, 1512. (3) Heinick: Surg. Gyn. and Obs., xv, 1912, 63. (4) Farrar: Surg. Gyn. and Obs., xvii, 1913, 586. (5) Rabinowitz: Am. Jour. Obstet., lxxi, 1915, 804. (6) Muller: Am. Surg., lxvii, 1918, 380. (7) Daniels: Beiträge zur Geburtshilfe und Gynäkologie, 1913, xviii, 312-328. (8) McClanahan: Archives of Pediatrics, 1921, xxxviii, 464. (9) Royster: Southern Medical Jour., 1920, xiii, 275. (10) Priami: Clin. Chir., 1914, xxii, 2. (11) Santoro: Arch. Ital. di ginec, 1914, xvii, 72. (12) Barr: Jour. Am. Med. Assn., 1914, lxii, 451. (13) Ludington: New York Medical Jour., 1920, 111-986. (14) Guiliano: Gaz. d. osp. e. d. clin. Milano, 1912, xxxiii, Nov. (15) Carmichael: Trans. Med. Chir. Soc. Edin., 1906, n.s. xxv, 226-235. (16) Quoted by Coley: Ann. Surgery, 1909, 1, 611. (17) Corner: British Med. Jour., 1908, Vol. 1, 17. (18) Royster: Am. Jour. Obstet., New York, 1911, lxiv, 472. (19) Coley: Ann. Surg., 1909, 1, 609. (20) Lejars: Chirurgie d'urgence, 1909, Paris, 805.

1131 DAVID WHITNEY BUILDING.

FEMALE MAMMAE IN RELATION WITH THE PELVIC ORGANS*

By David Hadden, M.D., Oakland, Calif.

IN *Surgery, Gynecology and Obstetrics* for December, 1921, there appeared an article by Keyser of Rochester, Minnesota, on "Massive Hypertrophy of the Breast." Some four cases that came under the author's observation were quoted, but in only one was any reference made to the menstrual history following the operation, and cessation of menstruation is noted in that case.

I am taking this opportunity to report one case of bilateral breast removal done for a fibroepithelial type of mammary hypertrophy with the idea of adding it to the recorded group, and also as a basis for discussion of the effect of breast removal upon the physiologic functions of the other reproductive organs.

Bilateral breast amputations are comparatively rare as there are not many conditions involving both breasts, requiring surgical procedures. So far in my own experience I have only had two such cases and in the few others that came to my attention there was no opportunity to obtain any subsequent history.

Case 1.—Miss D. H., age twenty-one years, had excessively large mammae that began to hypertrophy at the time of puberty, at the age of 13 years. She presented no pathologic symptoms except somewhat profuse menstruation at rather irregular intervals. The breasts gave discomfort because of excessive weight and markedly increased size during menstruation. At the age of seventeen she had a ruptured appendix with operation and drainage and as an aftermath a displaced uterus and omental adhesions. When she returned to Oakland a year later I found the breasts more markedly enlarged than when I first saw her as a girl of sixteen. Her periods were still excessive and painful because of the pelvic complications. Shortly thereafter I corrected the abdominal and pelvic pathology and did a double breast amputation because the physical discomfort and physical defect resulted in difficulty in obtaining occupation.

Rather to my surprise the menstrual function while painless was markedly suppressed following operation and continued so. The flow was very scant with excessive clotting and later, again associated with pain, though pelvically the patient was normal and the constipation from the previous adhesions had cleared up. I put her on mammary extract with an immediate amelioration of all menstrual distress and the establishment of a normal flow which remains normal provided the mammary extract is taken for a few days preceding the periods.

Case 2 served further to emphasize in my mind the relation of the mammary secretions to menstruation. An unmarried woman of 40 who had a double cystic mastitis, developed nodules which were more definitely indurated in the right side. Section showed a beginning malignancy confined to the primary site. In view, however, of the left mamma being more definitely cystic I did a double amputation. In this case also the menstrual function has undergone the same suppression.

In view of the fact that for a number of years I have been using mammary extract for small fibroids of the uterus with very definite reduction in the size of the growth and relief of the associated excessive menstruation and in a number of cases clinical cures, I rather expected to find if the mammae were removed an increase rather than a decrease in menstrual flow.

The physiologic changes in the breasts during pregnancy with the normal amenorrhea of lactation led me to argue the same way. The reversal of findings in these two cases has therefore been rather a surprise.

OAKLAND BANK SAVINGS BUILDING.

TWIN TUBAL PREGNANCY*

By WM. EDGAR DARNALL, M.D., F.A.C.S., ATLANTIC CITY, N. J.

TUBAL or ectopic pregnancy, formerly thought to be rather unusual, is now common enough to be uninteresting but the extreme rarity of the occurrence of twins in the same tube is worth reporting because of its infrequent occurrence. Twin tubal pregnancies are divided into two classes, those in which there are two fetuses in one tube and those in which there is a separate fetus in each tube.

Mrs. P. H., age twenty-eight, weight 185, a well developed colored woman, was referred in to the hospital by a local physician. She had been complaining of a dull aching in the pelvis and an occasional sharp pain and severe backaches. She had had no children but had had two miscarriages. Her blood and urine were approximately normal and the Wassermann test was negative. She began to menstruate at 12 years of age. Her periods were regular twenty-eight-day type with no pain and lasting 4 to 5 days. She had passed her last period, being about a month overdue. She had a brownish, but not very profuse discharge.

On examination she was very tender over the right side and the pelvis was filled with a mass of nodular fibroids and cysts of both ovaries.

On opening the abdomen she presented a mass of multiple fibromyomata of various sizes, cysts of both ovaries, a large left pyosalpinx and an equally large right tube, all agglutinated together in one mass with extensive adhesions. There was no free blood in the abdomen, and no rupture. A supravaginal hysterectomy was done. On account of the bluish color of the right tube it was opened. It presented the usual blood clot, membranes intact and two fetuses back to belly, spoon-fashion. The age of the fetuses was estimated to be between five and six weeks. There was but one placenta but there were two cords. It is difficult to understand how any woman with the extensive pathology exhibited in this case, affecting tubes, ovaries and uterus could possibly become impregnated under any circumstances. However, her recovery was normal and uneventful.

In reviewing the literature, Pool and Robbins[1] report up to 1910 twenty-nine authentic cases with more or less complete data on each. They also mention the findings of Pulcher, McCalla, Schauta and Costa who together reported seventy-three cases considered authentic. J. F. Baldwin.[2] 1913, reported a case that had been diagnosed as procidentia. Upon opening the abdomen there was found a twin pregnancy of one tube and a single embryo in the opposite tube. The fetuses were very early, being little larger than peas.

Noel Braham,[4] 1914, reported a case in which there was a fetus in one tube and a second fetus extruding from the fimbriated end of the same tube. The patient gave a history of six months' pregnancy but the fetuses measured only seven inches in length.

Gordon Taylor,[3] in 1918, operated on a patient suffering from ruptured ectopic pregnancy. The rupture was intraligamentous. He found one complete embryo and the head and shoulders of another but the balance of the second fetus was lost in the blood clot. It had no connection with the first and there is no description of the placenta or the arrangement of the cords.

The case of J. H. Carstens,[6] 1919, is rather unique. There was a diagnosis of tubal pregnancy. At operation there was a tubal abortion of the right tube and the culdesac was full of blood, containing about four ounces, but he made no mention of having seen the fetus. The left tube was not ruptured but on opening it he found therein two fetuses each about three-quarters of an inch in length. He makes no mention of whether there were single or double placentae or single or double cords. He estimated the age of the right tubal fetus as six weeks and the left tubal twins as three weeks.

Max Thorek,[5] 1921, reports a case in which the right tube was normal, the uterus enlarged and soft and the left tube enormously distended and ruptured. The fetuses which it had contained were lying free in the abdominal cavity. The specimen showed two male fetuses of about four months' duration attached to a common placenta. Other cases of interest include one reported by Treube[7] in which there were five embryos in one tube of three or four months' development. Saenger.[8] Barbat[9] and Wilmer Krusen[10] have each reported the occurrence of a triple tubal gestation of one tube. The cases of Baldwin and Carstens were instances of bilateral tubal pregnancy.

<div align="center">REFERENCES</div>

(1) Am. Jour. Obstet., 1910, lxi, 606.   (2) Jour. Am. Med. Assn., 1913, p. 722. (3) Brit. Med. Jour, 1918, June 29, p. 722.   (4) London Med. Jour., 1914, p. 239. (5) New York Med. Jour., Oct. 5, 1921.   (6) Jour. Am. Med. Assn., lxxiv, No. 22, p. 1518.   (7) Rept. Med. Soc.. Berlin.   (8) Centralbl. f. Gynäk., 1893, p. 148. (9) Pac. Rec. Med. and Surg, xii. No. 7, 1899.   (10) Am. Jour. Med. Sc., Jan. 4, 1902.

8 SOUTH MORRIS AVENUE.

AN UNUSUAL TYPE OF CARCINOMA IN A WOMAN
TWENTY-NINE YEARS OF AGE*

By ARTHUR STEIN, M.D., F.A.C.S., NEW YORK, N. Y.
Visiting Gynecologist, Harlem Hospital; Associate Gynecologist, Lenox Hill Hospital.

THE following case presents several unusual and interesting features which render it worthy of special attention.

The patient, a colored woman twenty-nine years of age, unmarried, was admitted to Harlem Hospital of New York City on November 18, 1922. Her mother died of pneumonia and her father of Bright's disease. As a child she had had measles, whooping cough and mumps. Menstruation commenced at thirteen, was of four days' duration, regular, twenty-eight day type. Her periods were not accompanied by pain and the last one was on November 15, three days before admission to the hospital. No miscarriages or confinements.

On admission she had a mass in the left groin which had been present for the past two years. It had gradually increased in size, become ulcerated, and bled at times. A week previous to her admission this mass spurted blood in a stream. She complained of no pain but had lost ten to fifteen pounds during the previous fifteen months.

Heart, lungs and abdominal organs normal. There was an old laparotomy scar in the median line. The region of the left inguinal fold, however, was the seat of a tumor the size of a man's fist, freely movable and with a hard base. The summit showed slight fluctuation on pressure and presented two ulcerating areas the size of a pea and of a penny. These areas were covered with a grayish, purulent discharge. The tumor was 4 inches in length at its base, $2\frac{1}{2}$ inches wide and 4 inches high (Figs. 1 and 2).

Vaginal examination showed a normal vulva, introitus and vagina small. The uterus was normal in size, anteflexed and pushed over to the right side of the pelvis by a mass which filled the left outer part of the pelvis. This mass was flattened out, immovable and had the following approximate dimensions: from left to right 3 inches, and about 5 inches thick. It extended close to the superior arch of the pubic bone but apparently had no direct connection with the above described inguinal tumor. There was a distinct line of cleavage between the internal tumor and the uterus. A rectal examination revealed identical findings.

A diagnosis of probable malignant tumor of the left pelvis was made with involvement of left inguinal glands, and operation was decided upon.

Operation.—November 24, 1922. The left inguinal tumor was easily shelled out *in toto* and was found to be very hard. All of the inguinal lymph glands were involved. There was no direct intimate connection with the pelvic tumor. The femoral vessels were not involved. A frozen section showed carcinoma. A laparotomy was therefore performed.

An incision in the median line revealed a pelvic tumor in close connection with the left pelvic bones and practically immovable. Attempts to shell it out or to removed it *in toto* were interfered with by the patient's poor general condition. Several pieces, however, were excised for examination. The greater part of the

tumor was a solid mass with many broken down and purulent areas. In the attempt to dislodge it one of the larger veins was severed but ligated without difficulty.

Close examination of the uterus and adnexa revealed them to be practically normal. The uterus was possibly slightly smaller than normal, but the left tube and ovary were entirely normal. The left round ligament was seen to pass over the tumor. The left broad ligament was absolutely free in its two-thirds near the uterus. The folds of the outer third were reflected over the tumor. The right adnexa were missing, having apparently been removed at time of previous operation. Because of the poor condition of the patient the operation was concluded and 500 c.c. of saline given intravenously. She died the same day, however, from shock.

An autopsy was performed on November 25 and I am indebted to Dr. T. A. Gonzales, Director of the Pathological Laboratory at Harlem Hospital, for the following report:

"The body is that of a negress about 29 years of age, well developed and fairly well nourished. Height 5 feet, 2 inches. Weight 115 pounds. No surface markings except a mid-line incision, a fresh surgical wound below the umbilicus closed with interrupted sutures. No free fluid in the peritoneal cavity. The
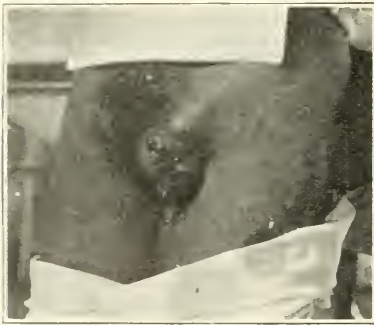
Fig. 1.—Inguinal tumor, patient standing.   Fig. 2.—Inguinal tumor, patient lying down.

diaphragm on the right side is at level of fourth rib and on the left side at a level with the fourth intercostal space. Heart normal. Both lungs normal except for congestion. Liver normal. Kidneys show no lesions. Adrenals show no lesions. Pancreas normal. Gastrointestinal tract throughout shows no pathological changes. Normal aorta.

"Right tube and ovary missing. Left ovary shows several small follicular cysts, some of which are filled with watery fluid and one with hemorrhagic exudate. Uterus is small, about $2\frac{3}{4}$x$1\frac{3}{4}$x1 inches. Its mucous membrane shows no changes. Cervix and vagina are normal.

"The broad ligament on both sides is normal out to pelvic brim. On the left side, intimately adherent to the lateral pelvic wall is a mass measuring 4x3x2 inches and ovoid in shape. The folds of the broad ligament at this situation are reflected over the mass, the whole of which is situated extraperitoneally. Although apparently adherent to the lateral pelvic bones, on dissection it is easily separated and peeled from the lateral pelvic wall. It is completely encapsulated and the external surface is slightly lobulated.

"On cut section the tissue is made up of small cysts which vary from one-fourth to one-half inch in diameter. Some of these cysts are filled with yellowish, semisolid material, others with cloudy fluid. The cysts are separated by white fibrous trabecula showing hemorrhage in some areas. (Figs. 3 and 4.)

"A careful search of the organs is again instituted for demonstration of a possible primary tumor but with negative result.

"Cause of death—Postoperative shock following operation for removal of metastatic tumor of groin and exploratory laparotomy."

Fig. 3.—Pelvic tumor. (Cross section.)

Fig. 4.—Microscopic section from pelvic tumor. x125.

Pathological Report.—Specimen No. 1. Pelvic tumor. Pieces of tissue were taken from various parts of this tumor for microscopic section and upon examination showed moderately thick walled cysts lined with several layers of small pale epithelium. Some of these cysts showed papillary ingrowths composed of a fibrous vascular tongue covered by a number of layers of epithelium. Those epithelia adjacent to the fibrous vascular tongue were more or less columnar in shape and upon extending the examination outward the cells became irregularly cuboidal. In many spots these cells had desquamated and were lying free in the lumen of the cysts. Other cysts were filled with a gelatinous semimucinous material. Still others contained cholesterin crystals and fatty detritus. In some spots there were small calcareous masses. The stroma in some places was markedly infiltrated with round cells and there were distinct areas of hemorrhage. Diagnosis of this specimen was papillary cystadenocarcinoma, probably of pseudomucinous variety.

Specimen No. 2.—Tumor of inguinal region. This specimen consisted of an irregular egg-shaped mass of tissue 7x5x3 cm. It was partially covered by skin. There were two prominent nodules about one inch in diameter, the domes of which presented several superficial ulcerations. The surrounding skin margin was undermined. These two ulcers were separated by bridges of normal skin tissue. The remainder of the mass was irregularly lobulated and apparently encapsulated. Cut section showed several small cystic dilatations, some of which were filled with friable material with here and there several yellowish specks. The remainder of the tissue was hard and finely trabeculated. Microscopic section showed epithelial cell cords and nests made up mainly of columnar epithelium which in some spots had a tendency toward papillary arrangement. The stroma was densely infiltrated with round cells. No gland structures could be made out. The skin was normal. Diagnosis was metastatic carcinoma of the lymph gland.

A microscopic examination of the left ovary revealed a number of small follicular cysts lined by a single layer of columnar epithelium and containing gelatinous, pseudomucinous material. One of these cysts presented a small papillary ingrowth covered with a single layer of epithelium. The fimbriated end of the tube was normal but surrounding it were several small microscopic masses, cystlike and filled in turn with irregular papillary masses covered with irregularly shaped columnar epithelium, the nuclei of which were pyknotic. These cell masses showed desquamation in some spots and in one particular spot there was a mass of ovoid epithelial cells. The stroma was markedly infiltrated with round cells. The remainder of the ovary and tube was normal. These latter masses appeared to be connected with the tube rather than the ovary.

To sum up the salient features of this case, we have a woman twenty-nine years of age who had been operated upon when she was nineteen years old. Nothing definite is known of this operation beyond the fact that the right tube and ovary and the appendix were apparently removed. When the patient comes under our observation ten years later she presents a large extraperitoneally located adenocarcinoma, all of the carcinomatous tissue being of ovarian origin, the tumor being located in the pelvic glands and developed in between the outer two-thirds of the broad ligament, i.e., extraperitoneally. She presents another tumor of similar structure in the left inguinal region. The extensive postmortem examination reveals no primary tumor. The question then arises, where did this unusual
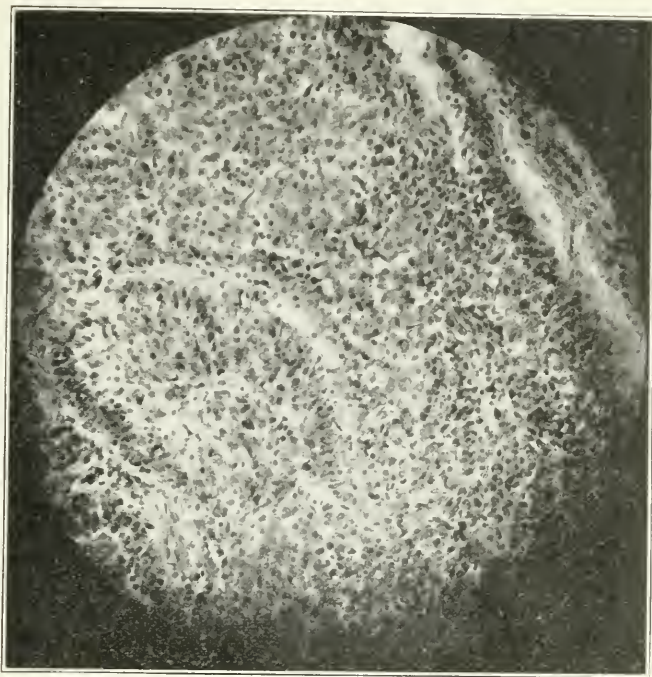
Fig. 5.—Microscopic section from pelvic tumor, x250.
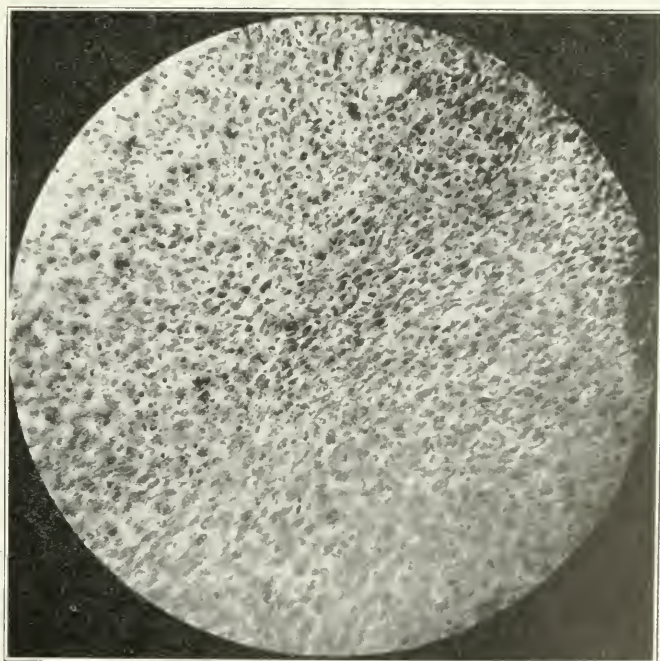
Fig. 6.—Microscopic section from pelvic tumor, x500.

type of carcinoma have its origin? There are several possibilities. First, the case may be that of a slow growing recurrence from an original ovarian tumor which may have been removed at the time of the first operation, ten years ago. (Nothing definite could be ascertained of this operation.) Secondly, the growth may have developed from a supernumerary ovary, extraperitoneally located between the folds of the broad ligament. Thirdly, it may have developed in Mueller's duct. To my mind the first supposition is the most logical. It is well known that ovarian adenocarcinomas recur after the passage of many years and although the instances in the literature are extremely rare, there are cases on record of recurrence after fourteen and even seventeen years. The cystic character of the adenocarcinomatous growth in the pelvis, the presence of pseudomucinous material within these cysts, and the papillary ingrowths all point to an ovarian origin. On the other hand there are features in this case suggesting a part played by the appendix which according to Bondy is always the primary seat of ovarian and peritoneal pseudomyomatous tumors. Rathe described the case of a woman forty-one years of age upon whom laparotomy was performed with extirpation of large bilateral cystic ovarian tumors. Two and a half years later a nodule the size of a hen's egg appeared in the cicatrix and was found to be a gelatinous tumor on the peritoneal side of the abdominal coverings. Re-laparotomy at the end of six months showed disseminated tumors in the abdominal cavity in the form of small cysts with gelatinous contents. The enlarged and cystic appendix was removed together with some of the tumors.

Ovarian cystomas, about two-thirds of which are pseudomucinous, are at the present day usually interpreted as fetal residues which later on begin to develop as the result of some stimulus or other. Although considered as benign these pseudomucinous cystomas are followed by carcinoma formation in a small percentage of cases. Rare observations are on record in which pseudomucinous cystoma and adenocarcinoma existed together and on the basis of the microscopic findings were considered as having probably originated independently of each other.

In a recent statistical record from the Pathological Institute of the London Hospital, Gordon Ley notes 60 ovarian carcinomas including 25 primary and 38 secondary cancers. The primary carcinomas were found to be derived either from remnants of the wolffian duct (16 cases) or from pseudomucinous cysts. The malignancy, measured by the formation of metastases, was greater in carcinomas of the wolffian duct than in the carcinomas developed from pseudomucinous cysts. In both varieties the metastases spread chiefly on the peritoneum. The sequence of the carcinomatous glandular infection in the so-

called wolffian carcinomas was such that metastases appeared first in the lumbar glands, then in the iliac, celiac and pancreatic glands. It is interesting to compare this statement with the findings in the case forming the basis of this article in which the metastatic tumor occupied the pelvic glands and extended extraperitoneally between the outer two-thirds of the broad ligament. Aside from the question of metastases unusual interest is attached to this case owing to the coincidence of a number of remarkable features, important from the practical as well as theoretical viewpoint of tumor research.

REFERENCES

Bondy: Monatschr. f. Geburtsh. u. Gynäk., 1913, xxxvii, 509. *Ley, Gordon:* Proc. Roy. Soc. Med., 1920, xiii, No. 7, Section of Obst. & Gynec., p. 95. *Rathe, B.:* Monatschr. f. Geburtsh. u. Gynäk., 1913, xxxvii, 322.

48 East Seventy-fourth Street.

A CASE OF PARATYPHOID BETA BACILLUS INFECTION OF AN OVARIAN CYST*

By James A. Corscaden, M.D., New York, N. Y.

THE patient was a strong, healthy, well educated woman of thirty-four, unmarried, who enjoyed good general health and normal functions, except that the last menstrual period began five days early, coincident with the onset of her present illness.

Previous diseases: scarlet fever, measles, mumps as a child, all uncomplicated. Seven years before the onset of the present illness she was operated on for acute appendicitis and at this time a right ovarian cyst was removed.

Exposure to disease has not occurred as far as known. Patient was on vacation and out of contact with any sick person or hospital up to two weeks before the onset, since which time she has been taking care of a case of gastric ulcer.

The present illness began with a chilly sensation followed by moderate prostration, and a temperature of 100.6° F. The next day the prostration increased and the temperature rose to 102°. On the third day of the disease she went to bed and called a physician.

Physical examination on the third day showed a febrile patient possibly a little more apathetic than would be accounted for by the temperature, although this was 103°. The lower abdomen presented a mass reaching from the lower limits of the culdesac nearly to the umbilicus, and measuring about 15 cm. in diameter. It was rounded, smooth, nonsensitive, limited in mobility by the confines of the pelvis and the anterior abdominal wall. The uterus was felt posteriorly and to the right, evidently crowded down by the mass. The hymen was intact. Leucocyte count 10,000, 72 per cent polymorphonuclears; blood culture sterile; urine normal (no culture taken).

A provisional diagnosis of fever of unknown origin and ovarian cyst was made. Influenza and typhoid were suspected.

The temperature continued high in the evening and was lower in the morning.

The peak dropped gradually until it was down to 102° on the ninth day of the disease. It then gradually climbed again up to 104.6° on the twelfth day. The lower limit rose in a corresponding manner, being 102° on the twelfth day. The feelings of the patient and her general appearance corresponded to her temperature.

Local symptoms were absent except that on the fourth day there was a slight cough. The menstruation ceased at the end of five days, having apparently been no different, except in its onset, from a normal period. Physical examination remained unchanged until the sixth day when there seemed barely perceptible tenderness over the cyst. This seemed to be slightly firmer and larger, although measured by its relation to the umbilicus it was unchanged in size. On the tenth day the cyst seemed definitely firmer. The leucocyte count was 12,600. Patient was admitted to the hospital with a diagnosis of infected ovarian cyst. Further tests showed a negative Widal, sterile blood culture, Wassermann was negative; x-ray of chest, negative.

Operation on the twelfth day of the disease disclosed a cyst 15 cm. in diameter. The anterior and upper surfaces were pale and had the usual appearance of an ovarian cyst; the posterior surface was bound in the pelvis by soft, easily separated adhesions. At this point it was friable and red. There had been some disturbance of the circulation from a half twist of the vessels caused by the raising up of the cyst in its growth and the pushing of the uterus downward and backward. It was attached to the left broad ligament by a pedicle 2 cm. in diameter. The tube ran over its upper and anterior surface. This appeared normal except for the increase in length. The wall of the cyst was 2 millimeters thick, the inner surface being mottled, brownish white. The cyst wall showed no inflammation in the section cut from the anterior portion but was infiltrated by round cells and polymorphonuclears in the pelvic portion. It was lined by low epithelium. The cyst contents were dark red, evidently old blood through which ran some yellowish streaks. Ovarian tissue was found at one point in the wall of the cyst.

The uterus was 8 cm. in diameter and contained numerous small nodules up to 1.5 cm. in diameter, evidently myomata. The tube was long, not thickened, and microscopically was normal. The right adnexa were not made out. The rest of the abdomen was not explored.

The cyst was ruptured in removing it. Some fluid was spilled. The pedicle was transfixed and ligated. A cigarette drain was drawn through a colpotomy wound. The abdominal wall was closed tight except for rubber dam drains into the subcutaneous fat.

Culture of cyst contents showed the paratyphoid bacillus. This organism was "found in great numbers in the original smear and gives typical sugar reactions and agglutinates its specific serum in dilutions of 1/50 to 1/1,600."

Examination of a stool and urine five days after the operation showed no B. paratyphosus. These were repeated at intervals. Finally on the forty-fifth day of the disease, thirty-three days after the first and twenty-one days after the second operation mentioned below the urine showed the organism on one occasion.

The wound was infected and on the seventh day after operation showed B. paratyphosus B., and B. coli. On the fourteenth day after operation an intraperitoneal subhepatic abscess which grew B. pyocyaneus and staphylococcus aureus was opened and drained. This wound healed up rapidly. The abdominal wound was still unhealed when the patient was discharged. The general condition corresponded to the local. The temperature dropped to 95° after the first operation, rose and dropped again after the wound and peritoneal abscess were opened, and then gradually fell, becoming normal on the thirtieth day of the disease. Prostration and the general appearance of the patient corresponded to the temperature. She took fluids poorly and required several hypodermoclyses. The patient was finally discharged fifty-six

days after the original operation, still weak but able to go about, and 18 pounds below her weight before the onset of the disease. B. paratyphosus Beta Widal was negative on the fortieth day of the disease.

The case is reported because it seems to be one of localized infection without previous distinct constitutional disease. While of course the organism must have a portal of entry, it may or may not cause a reaction because of its presence in the blood stream. This is common enough amongst the pus-forming organisms but is uncommon with the typhoid group. In this case the organism was searched for in the blood, feces, and urine and was only found once in the urine late in the disease, while the cyst contained masses of bacteria (a pure culture of B. paratyphosus Beta).

Of course it is not possible to say that there was no general infection preceding the localization in the ovarian cyst. We do not know the moment at which the cyst became infected. There had been a steady though slight fall of the temperature for nine days followed by a rapid rise during the three days previous to operation. It is possible that the organism did not lodge in the cyst until this time.

On the whole it would seem that the organism entered the body in the usual way probably through the digestive tract. Mild infections of the alimentary tract are more common with the paratyphoid beta than with typhoid. Through the minor injury this organism got into the blood. Here it did not cause a reaction, neither did it grow to any extent. The cyst had evidently suffered from some circulatory disturbance as indicated by the old blood in it. It may be supposed that the mixture of cyst contents and old blood furnished a favorable medium for the culture of the organism.

The second point of interest is the absence of local symptoms and physical signs in a cyst so badly infected. Even at the time of operation there was barely any tenderness and at no time was there any pain.

In conclusion it may be said that the case represents a massive infected ovarian cyst which had been partly twisted without local symptoms. The existence of a preceding general infection, while possible, is against the available evidence. (Negative Widal. Sterile cultures of blood, feces, and urine.)

BIBLIOGRAPHY

Achard, C., and Bensaude, R.: Bull. Soc. Med. Hôp., Paris, 1896, xiii. 826. *Blechman, G.:* Nourrisson, 1922, x, 38. Abst. in Jour. Am. Med. Assn., 1922, lxviii, 926. *Bugge, G., and Diercks:* Ztschr. Fleisch. u. Milchhyg., 1921-22, xxxii, 3, 30, 44. *Carles, J.:* Les fièvres paratyphoïdes, Paris, Baillière, et Fils, 1916. *Cushing, H.:* Johns Hopkins Hosp., Bull., 1900, xi 156. *Davison, B., and Whittington, T. H.:* Quart. Jour. Med., 1915-16, iv, 98. *Dive, G. H.:* Jour. Roy. Med. Corps, 1922, xxxviii, 306. *Erscheinungen:* München. med. Wchnschr., 1920, lxvii, 814. *Hage:* Deutsch. med. Wchnschr., 1919, xlv, 971. *Klein T., and Torry, R. G.:* Am. Jour. Med. Sci., 1920, clix, 548. *Kranepuhl:*

München med. Wehnschr., 1905, lii, 1331. *Löhr, H.:* Med. Klin., 1921, xvii, 643. *Manteufel, P.:* München., med. Wehnschr., 1905, lii, 1331. *Mallie, H.:* Jour. de Med. de Bordeaux, 1921, xcii, 245. *Minet, J.:* Bull. Soc. de Med. de Hop., Paris, 1917, 861. *Minet, J.:* Presse méd., Paris, 1916, No. 19, p. 147. *Moreou, L:* Bull. Soc. de Med. de Hôp., Paris, 1916-17, xl, 1960. *Morgan, H. J.:* Bull. Johns Hopkins Hosp., 1921, xxxii, 195. *Nobécourt, P. Peyre:* Bull. Soc. de Med. de Hôp., Paris, 1916, xl, 152. *Raebiger, H., and Wiegert, E.:* Deutsch. tierarzt. Wehnschr., 1921, xxix, 649. *Raymonaud, H.:* Bull. Soc. de Med. de Hôp., Paris, 1916, p. 588. *Raymond, Parisot. and Orticoni:* Presse méd., Paris, 1916, p. 23. *Ronchetti, V.:* Riforma Med., 1921, xxxvii, 871. *Salanier, M.:* Compt. rend. Soc. de Biol., 1916, lxxix, 756. *Sales, G., and Vallery-Rodat, P.:* Nourrisson, 1922, x, 51. Abst. in Jour. Am. Med. Assn., 1922, lxxviii, 926. *Salvat and Navarro:* Rev. espan. de med. y. cirug., 1922, v, 324. *Scott, R. L., and Johnson, W. H.:* Lancet, London, 1915, i, 852. *Smyly, H. J.:* Arch Diagn., 1920, xii, 213. *Taberlet, H.:* Thése de Paris, 1921. *Voigt, O.:* Monat. f. Kinderh., 1922, xxiii, 23. *Walker, E. W. A.:* Jour. Hyg., 1922-23, xxi, 87. *White, S. M.:* Minn. Med., 1921, iv, 628. *Widal, F., and Nobécourt, P.:* Semaine méd., Paris, 1897, xvii, 285. *Wordley, E.:* Lancet, London, 1920, ii, 794.

50 EAST SIXTY-THIRD STREET.

REPORT OF TWO CASES OF OBSTETRIC SEPSIS*

By GEORGE L. BRODHEAD, M.D., NEW YORK, N. Y.

CASE 1. BACTEREMIA FOLLOWING ABORTION, WITH RECOVERY

IN the early part of November, 1920, the writer was called in consultation to see a patient thirty-two years of age, the mother of two children, who, on or about October 10 visited a physician in order to have an abortion induced. A gauze pack was inserted into the uterus and the patient returned home. Moderate bleeding and pain commenced soon afterwards and the woman was visited daily by this physician for about three weeks. During this time she presented an irregular fever. The uterus was swabbed out with iodine several times and also curetted. On one occasion a severe chill with a temperature of 104.2° F., with a pulse of 120 was noted, after which the consultation was requested.

Examination on November 6 showed a uterus normal in size with a moderate amount of surrounding exudate. The prognosis at this time seemed favorable. Two days later the temperature rose to 105.8° F., and severe pain was noted in the calf of the right leg. A blood culture on November 10 showed twenty-five colonies of Streptococcus hemolyticus pyogenes to each c.c. of blood. Phlebitis of both legs developed, the patient became restless and delirious; urination and defecation were involuntary and the patient was seriously ill. On November 12 the temperature rose to 106° F. A transfusion of 900 c.c. of blood was given followed by marked improvement. An additional 500 c.c. of blood was given on November 14. On November 16 a severe chill was followed by labored respiration, stupor and cyanosis. The pulse became very weak. A few râles were noted in the right chest in front and numerous râles in the left chest posteriorly. Alternating periods of stupor and restlessness with delirium followed. On November 19 an additional 500 c.c. of blood was given from an immunized donor. On November 22 pelvic examination showed a more movable uterus with a small exudate on the right side and absence of tenderness in the fornices. Injection of autogenous vaccines was then begun and continued for some days without any

---

apparent effect. The urine contained a marked trace of albumin but was otherwise negative. On November 28 a blood count showed 60 per cent hemoglobin; 4,000,000 red cells; color index 0.75, and 20,000 leucocytes with 88 per cent polys. On November 30 the blood culture still showed 50 colonies to 1.5 c.c. of blood. As the result of a consultation on November 28 a diagnosis of possible right hipjoint localization was made in addition to the pelvic phlebitis and a possible pyelitis. The restlessness and delirium increased and on December 6 a large abscess of the right buttock was incised. On December 16 the blood count showed 3,100,000 red cells, 57 per cent hemoglobin, 14,400 leucocytes with 90 per cent polys. On December 17 a large abscess of the left arm was incised. A bed sore of considerable size developed which persisted for many months. The culture from the arm abscess showed the Streptococcus hemolyticus. Another transfusion of 500 c.c. of blood was given on December 18; the patient improved, the fever diminished and on December 30 a vaginal examination was negative. The patient then made a slow recovery with gradual improvement in the red cell count. On January 6 the temperature again rose to 103.3° F., and subsequent to this another blood transfusion was given. The blood culture then showed diminution in the number of colonies per c.c. At the end of January a severe pain in the right hypochondrium led to a diagnosis of possible kidney involvement and a cystoscopic examination showed evidences of inflammation in the left kidney but there was no growth in the catheterized urine specimen. On February 24 the presence of pain, tenderness, and swelling in the left thigh prompted the evacuation of a large abscess in this region. A final blood culture made on March 3 was negative and the blood count showed over three million red cells with 52 per cent hemoglobin and a color index of 0.81 with 16,500 leucocytes and 74 per cent polys. After March 25 the temperature was practically normal and it may be stated here that the patient ran a fever for a total of 160 days. On April 11 a final transfusion of 500 c.c. of blood was given and examination then showed 4,400,000 red cells with 80 per cent hemoglobin; a color index of 0.90 and 17,000 leucocytes with 75 per cent polys. The patient was gradually allowed out of bed and was removed to the country. Progress during the summer was very slow and at the time of this report, two years after the onset of her illness, the woman is only able to cross her room alone on crutches but her physical condition is greatly improved.

CASE 2. PUERPERAL SEPSIS WITH MULTIPLE ABSCESSES OF THE UTERUS DEVELOPING LATE IN THE PUERPERIUM

THE patient, a young negress, primipara, was admitted to the Harlem Hospital on April 7, 1922, at 4 P.M., in labor. Pains began at 5 A.M., the membranes were intact, vertex presented. Labor progressed normally and full dilatation was present at 2:15 A.M., April 8. Membranes ruptured shortly after and the woman delivered herself spontaneously at 4:50 A.M., the placenta and membranes coming away about twenty minutes later. There were no lacerations, no vaginal examinations during labor, and four rectal examinations. The puerperium was uneventful until the ninth day postpartum when the patient was examined for discharge from the hospital. The cervix admitted one finger and the uterus was the size of a three months' pregnancy. The lochia were moderate and a small tender mass was felt in the left fornix; temperature was 103.2° F., pulse 98. The woman was put back to bed at once and a blood count showed 30,000 white cells with 79 per cent polys. Later in the same day the patient developed tenderness in both lower quadrants of the abdomen. Two days later the uterus was somewhat larger, soft and retroverted, and distention and tenderness of the lower

abdomen developed. The woman appeared to be very sick with low resistance. A diagnosis of pelvic peritonitis was made. Four days after the onset the leucocytes had dropped to 13,000 with 83 per cent polys. Blood cultures were negative. The patient's general condition became worse and she died on the twentieth day postpartum. A vaginal examination on the day previous showed the cervix posterior, admitting one finger and fornices negative. The autopsy showed a gangrenous endometritis and pyometritis, acute hyperplastic splenitis, fatty liver, pulmonary edema and marked visceral congestion. Particular interest centers in the uterus which was 12 cm. long, with normal tubes and ovaries, no thrombosis of the surrounding plexuses. On opening the uterus the cervix was found dark green in color and patulous with a slight tear in the region of the right fornix. Upon incising the uterus numerous small pus pockets were found distributed throughout the muscle, especially towards the cervix. The endometrium was of a dark greenish color. Microscopic sections of the heart muscles showed some fibrosis, especially about the blood vessels. The spleen showed marked extravasation of blood and white cell infiltration with necrosis and destruction of the substance. The uterus likewise showed an extensive infiltration.

The case is of interest as showing an evidence of a severe localized septic process coming on late in the puerperium and in which the exciting cause could not be traced to the labor which proceeded spontaneously and during which no vaginal examinations were made.

REPORT OF A CASE OF RETINITIS GRAVIDARUM WITH NO OTHER INDICATIONS OF TOXEMIA

By James Knight Quigley, M.D., F.A.C.S., Rochester, N. Y.

THIS case is reported because of the rarity of retinitis in pregnancy without any of the usual signs or symptoms of toxemia. In a search of the obstetrical and ophthalmological literature no reference could be found to a similar case, all other case reports and articles dealt with instances of retinitis in pregnancy accompanied either by indications of nephritis or a toxemia as shown by a high blood pressure or by the usual symptoms of toxemia.

Mrs. E. F., age twenty-five, white, iii gravida. Mother died of nephritis at 45, father alive and well, one sister and one brother both living and in good health.

Patient had a severe influenza in 1918 without pneumonia. Always quite strong and vigorous.

Menstruation began at fifteen, 30-day type, regular, lasting five days, of moderate amount, painless. Married: five years.

Previous obstetrical history: Two pregnancies of normal duration accompanied by moderate amount of early nausea and vomiting, previous labors, 16 hours and 3½ hours in length respectively; first child delivered by forceps, second a spontaneous birth; each weighed eight and a half pounds. Last menstruation May 10, 1921, Quickening Sept. 1. Expected date confinement, Feb. 17, 1922.

Reported first time on Nov. 17; previous to this time she had been under the observation of a Boston obstetrician.

Physical examination: Color good, well nourished, mentality keen, picture of

health. Breasts large, good gland substance, erect irregular nipples. Abdominal examination—irrelevant.

Blood pressure: 11/17, 99/60, 3 urinalyses negative for sugar, albumen
            12/21, 102   casts, blood or pus cells.
            1/5, 106/52
            1/15, 100

At the three or four antepartum visits the patient complained of no abnormal symptoms and presented no unusual signs. Four days after the last visit or on Jan. 19, in the afternoon she reported by telephone that the vision of the right eye was "blurry", for 24 to 36 hours she had had a coryza and backache and thought her disturbance of vision was attributable to this condition. She asked if she should consult an oculist and this was urged.

Dr. Edwards reported within a few hours that he had found a well marked retinitis probably of toxic origin. The patient was sent immediately to the hospital for observation and preeclamptic treatment instituted.

Urinalysis: negative for albumen and sugar, microscopical: rare white blood cells.

Blood count: Red cells, 3,630,000; white cells 6,800, hemoglobin, 65 per cent.

Blood chemistry: Nonprotein nitrogen 17.2 mg. per cent; Uric acid 1.8 mg. per cent; Sugar 5.15 per cent.

Functional kidney test: Per cent, first hour 16.6 per cent
                     "   " second "   12.5 per cent
                                ——————

                  Total 2 hours   29.1 per cent

Wassermann negative to both antigens. Sinuses and nasal fossae negative. Teeth x-ray: no evidence of apical infection.

As the retinal lesion was progressive, after 48 hours' observation induction of labor was decided upon and accordingly carried out by introduction of a No. 3 Voorhees bag, resulting in a spontaneous delivery in three and one-half hours of a six and one-half pound boy in good condition; subsequent course of the patient from an obstetrical standpoint was uneventful.

Report of Eye Examination by Dr. Walter D. Edwards

Vision of right eye 20/30, left eye 20/20.

Fundus of right eye shows a streak of exudate running from the margin of the disc toward the macula ending at a point just above the fovea.

The vessels are congested and tortuous and a few flame-like hemorrhages can be seen on the nasal and temporal sides of the disc. The margins of the disc are indistinct. The picture is one of albumenuric neuroretinitis.

Jan. 22.—More hemorrhages and exudate present in the fundus. Process progressing quite rapidly. Vision slightly more blurred.

Jan. 25.—Delivery two days ago. Process in fundus receding. Hemorrhages darker.

Jan. 27.—Hemorrhages absorbing rapidly. Margins of disc clearer and vessels nearly normal in size.

Feb. 12.—Vision normal. Hemorrhage and exudate nearly absorbed.

Society Transactions

Dr. John O. Polak, Brooklyn, N. Y., presented a paper entitled **Dry
Labor.** (For original article see page 488.)

DISCUSSION

DR. GRANDISON D. ROYSTON, St. Louis, Missouri.—I would like to ask Dr.
Polak whether he has ever known a child to die during labor before the membranes
had been ruptured, where no meddlesome interference had been practiced.

I was glad to hear him say that he makes use of morphine and scopolamine in
these cases. We have been doing that for seven years and the fetal mortality
among our last thousand private cases was seven-eighths of one per cent. We give
only a single dose of one-sixth grain of morphine instead of one-quarter grain and
do not repeat. We do not administer it in cases of inertia and rarely in cases of
premature labor, because a premature child stands morphine badly. We have not
found that hyoscine or scopolamine in moderate dosage had any appreciably ill ef-
fect upon the mother or child.

DR. WILLIAM D. PORTER, Cincinnati, Ohio.—Dr. Polak's objections to
manual dilatation are well taken. Complete manual dilatation is a physical impossi-
bility, even if the cervix is not torn. His objection to the hydrostatic bags is, I
think, well taken, if he uses a bag reenforced with unyielding material, such as the
Champetier de Ribes bag and some of the others. However, there is a bag which
I always use, namely, the Braun bag, which is balloon shape, made of soft rubber
which dilates equally in all directions and expands without any restriction as to
shape. That bag will produce dilatation without the objectionable features the
essayist mentioned.

As to the use of boroglyceride, I am skeptical. In the first place, it is an ob-
jectionable procedure to be used by the general practitioner. In the second place,
glycerin acts simply by abstracting water from the tissues. If you have a condi-
tion in which the membranes are ruptured you would have that action neutralized
before it has any particular effect.

I believe a general criticism might perhaps be made of the paper to the effect
that the dangers of dry labor are rather exaggerated. In my experience the dan-
gers mentioned do not develop, as a rule, and to say that a woman should not be
allowed to be in labor more than 12 hours in these cases seems an extreme state-
ment.

DR. JAMES K. QUIGLEY, ROCHESTER, NEW YORK.—I would like to ask Dr. Polak as to the percentage of iodoform in the packing, and about the average time it is expelled?

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—The author emphasizes the importance of considering the resistance of the patient. In this connection I want to refer to the finding of streptococci in such a large proportion of cases. I do not think the author means that under ordinary circumstances the finding of these organisms has any significance except that the patient's resistance is lowered.

It would be interesting to have Dr. Polak describe the types of streptococci that were found, and also whether mutation may occur in these organisms under the conditions that prevail in the cervix and during labor.

DR. MAGNUS A. TATE, CINCINNATI, OHIO.—It is most interesting to examine, as I have done, hundreds of women after they have been confined, in order to see the condition of the cervix. It is most unusual to find a cervix which has not been torn in the normal or abnormal cases. They are all torn to some extent.

There is one thing that I probably at this time stand alone in, in this Association, and that is, in manual dilatation of the cervix in certain cases. If we take a case where the os is effaced, with a thin dilatable cervix, such a cervix can be slowly, easily and readily dilated without a tear. I have done this many times, and have yet to see any damage or danger in such manipulation. I grant that we should not attempt manual dilatation in every case. That would be foolish, foolhardy and meddlesome obstetrics.

DR. A. M. MENDENHALL, INDIANAPOLIS, INDIANA.—A patient whose membranes have ruptured and who is not in labor should be most thoroughly guarded against any possible infection. In other words, I would have such a woman go to the hospital, be properly prepared for future delivery and be given the proper sort of trial, resorting to every precaution to guard against infection.

DR. POLAK (closing).—I want to answer Dr. Mendenhall's question first and go backward. In the first case, where rupture of the membranes has occurred before labor begins, with unprepared soft parts, with the head in the brim, and the head and pelvis presumably normal, my experience is to let the patient absolutely alone. Neither the child nor the mother suffers any injury from rupture of the membranes so long as the woman is not in active labor; she is kept under proper observation, and the cervix is not infected by repeated examinations; in other words, these patients should be under observation in the hospital but are let alone. I have seen several babies die before the woman has fallen into labor, but I have seen so many hundreds delivered without any trouble, that I feel the two cases that stand out in my memory very distinctly are these, one that occurred a month ago and one six years ago. As to the case of six years ago, the woman has never been pregnant since; that stands out in my memory very definitely, and fetal death occurred before the woman started in labor. Examination of the placenta showed the cause in both of these cases. There were old changes in the placenta, not new ones.

In regard to the gauze left in the uterus, I personally have never had to pull it out. Potter, of Buffalo, assured me recently that in all of his experience he had never to pull it out; it is expelled at the end of about twenty-four hours; sometimes it will remain, as it did in one of my cases, thirty-six hours before it was expelled, and it maintained the firmly contracted uterus just as the uterine packing does. In that way it does the two things, it prevents the extra hemorrhage which these women have, and in the second place, it causes contraction at the

placental site and defends the woman against the invasion of vaginal bacteria that are bound to migrate into the uterus.

In regard to the vaginal pack, it is the old pack that we have used now for nearly thirty years in every case where the membranes were ruptured. We do not do that now. We resort to packing of the vagina where there is a rigid os, where the cervix is thickened from nonsupport, where others would either use morphine, or bags, or manual dilatation. If we could teach the practitioner to boil his gauze and use sterile boroglyceride solution, which reduces edema, he would get better results. If we pack the vagina firmly, it is expelled as the baby pushes it down. Our rule used to be that when the pack was pushed out to send for the doctor, and if the head was down fully on the pelvic floor he would put on the forceps.

In regard to one other question, there is an impression that I said that when any woman remained for twelve hours in labor she should have interference. There was a third class of cases with the membranes ruptured, where there was a slight disproportion between the head and the pelvis, with undilated cervix, and under ordinary circumstances we would permit the woman to have the full test of labor with the membranes intact. That woman, if she did not show advance in twelve hours of active labor, needed the greatest of obstetric care, because cervical dystocia in that type of case results in dead children. Although I saw the Braun bag used in Vienna a number of times, I have never used it.

In regard to manual dilatation, Dr. Tate said I made the statement that every cervix was lacerated during labor, and consequently you feel that if you lacerate it more, it does not hurt. But we do want to minimize these things, and when the cervix is obliterated with the os changed under anesthesia, if we get that cervix up to dilatation of the full hand or more, I believe you will increase the trauma.

Dr. WILLIAM E. DARNALL, Atlantic City, N. J., reported a case of **Twin Tubal Pregnancy.** (For original article see page 537.)

DISCUSSION

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—With reference to the case of multiple pregnancy referred to by the essayist, I can only state that I reported the case several years ago in the Journal of the American Medical Association. At the time of the operation there had been no suspicion at all that the patient was pregnant. At the operation three curious lumps were noticed, about like average peas, two in one tube and one in the other. The specimens were turned over to the hospital pathologist and in due time he reported that it was a case of triple pregnancy.

Dr. G. D. ROYSTON, St. Louis, Mo., presented a paper entitled **Gono-coccus Arthritis in Pregnancy.** (For original article see page 512.)

DISCUSSION

DR. WM. M. BROWN, ROCHESTER, N. Y.—Dr. Royston I believe made the statement that the ordinary therapeutic measures that would be instituted otherwise should not be undertaken during pregnancy. I have not had much fear of that. In fact, it has been a common experience that where we have had badly infected girls come in with a profuse vaginal discharge any time during the last few weeks or few months of pregnancy, if we put these patients in the hospital, and packed the vagina thoroughly with 10 per cent formalin gauze, ten minute application every day or two, it certainly cleaned them up, and it is, to my mind, a valuable preparation for a delivery which may be imminent.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—I would like to emphasize one point both from the standpoint of the laboratorian and clinician. The essayist has indicated that a vaginal smear is often useless. From a laboratory standpoint it is quite useless excepting where, of course, you have a positive finding, but a negative finding means absolutely nothing. Smears should be taken routinely first from Skene's glands, after the finger has been inserted so as to practically obliterate the depth of these glands from one side and then from the other, and next from the cervix. Sometimes it is necessary to exert pressure upon the cervix in order to get good smears, and thirdly, from the meati of the Bartholin ducts. Here, a certain degree of massage of the duct should be made to be sure of getting a fertile smear.

DR. E. SPEIDEL, Louisville, Ky., presented a paper entitled **A Routine Treatment for Hyperemesis Gravidarum.** (For original article see page 481.)

DISCUSSION

DR. MAGNUS A. TATE, CINCINNATI, OHIO.—I know of no more distressing disease to treat than the excessive vomiting of pregnancy. In the first place, we do not know the cause. In the second, we treat it symptomatically, and in the third place, we do not know when to bring on labor. We have tried bicarbonate of soda, glucose, sodium bromid, ingluvin, oxalate of cerium, etc., and we have tried corpus luteum, but the latter in my hands has been disappointing. I have even given morphine, and according to Potter, have had patients chew gum. Every case is an individual one, and we must do the best we can, usually treating them symptomatically. If we encounter a neurotic and are sure of diagnosis, we are reasonably certain we can cure such a case.

The grave and great question, however, is when to interrupt pregnancy. I am free to confess, after seeing a good many cases, I do not know with any degree of certainty. If we have a case with high temperature and rapid pulse, and patient is getting worse daily, we interrupt pregnancy, but the time that we are to do this, is the uncertain factor.

DR. HERMAN E. HAYD, of BUFFALO, NEW YORK.—I was called in consultation a few weeks ago and had a very unfortunate experience. This woman had three children previously; she had suffered a great deal from nausea and vomiting with all of them, but finally the symptoms subsided and she was safely delivered. When I saw her she had a temperature of only 99.5° by rectum; a few days before it had been 100; pulse 118. I was satisfied the thing to do was to empty the uterus. The woman vomited practically continuously for at least three months that she was pregnant. We had her removed to the Deaconess Hospital, and we gave her a little ether and I did a hysterotomy in a very few minutes with very little bleeding and introduced my finger and emptied the uterus. She bore the operation very well and when put to bed she quickly developed a rapid pulse, 140, and she died in four hours. This is a situation I would not have believed possible, namely, that a woman could be in such a serious condition with no temperature and pulse of only 118. Her blood pressure was low, and she was quite jaundiced.

DR. GEORGE W. KOSMAK, NEW YORK CITY.—I feel complimented that Dr. Speidel has read my book and has referred to my statement that these cases must be individualized. I still feel that is the proper way to handle them, and I do not consider that Dr. Speidel has really advanced a new treatment in what he has presented, because in his recommendation he simply meets some of the underlying condi-

tions that are present in almost all cases of hyperemesis. These women need more than anything else a supply of fluid. I am speaking of the average case, and whether you mix the fluid with bicarbonate of soda, glucose, or something else seems to be immaterial. Having met this indication, I think the remainder of the symptoms must be treated individually, and we must study each patient and do the best we can for her.

I have seen in recent years an increasing number of cases in which hemorrhages have occurred. These hemorrhages have come either from the mucous membranes of the stomach and intestines, or they have arisen in the uterus. I believe that the occurrence of hemorrhages from either of these sources should be accepted as an indication for emptying the uterus, no matter how favorable we may think the result of our treatment is. I do not consider it well to wait for the appearance of jaundice or the extreme emaciation that we sometimes see in cases in which attempts at mouth feeding have been kept up. I feel that the logical thing is to recommend emptying of the uterus in any case in which the vomitus assumes a coffee-ground character or in which blood is noted as having passed by the rectum, or in which there is bleeding from the uterus. A case of that kind came to my attention recently in a young girl, who was anxious to have a baby, and who had been vomiting for four weeks. She came to the hospital and within a few days the vomiting practically ceased with the methods that Dr. Speidel has outlined. But she continued to bleed from the uterus. Now, whether she was undergoing abortion for mechanical reasons; whether the continued vomiting was inducing that abortion, or whether we were dealing with some other cause I am not able to say. That girl was steadily losing blood. I made a careful speculum examination and found the cervix was considerably eroded; it was patent; I could almost introduce my finger, and I decided to empty the uterus. A gauze pack was introduced to soften the cervix more, and a blood clot of considerable size presented within the cervix. The next day the uterus was readily emptied. The sac was intact, and the fetus was apparently perfect, but I found a considerable amount of ecchymosis around the placenta. The placental separation was evidently due to a toxic cause. I do not believe even the cessation of vomiting would have carried out that pregnancy; I believe she would have aborted, or the fetus would have been malnourished to such an extent that it would have perished.

As I have said, these cases must be individualized, and the treatment which Dr. Speidel has very graphically outlined should be pursued; but aside from that other symptoms must be watched for, and above all, pregnancy interrupted when, notwithstanding the improvement in the vomiting, there is other evidence to show the patient is not doing well.

DR. JAMES F. BALDWIN, COLUMBUS, OHIO.—Dr. J. D. Dunham a local internist, puts the patients to bed and keeps them as quiet as possible under absolute rest. His treatment consists in feeding them small quantities of dry food with no liquids to wash it down. This food adheres to the walls of the stomach as would a dose of dry calomel. I have not had occasion in a single instance to empty the uterus where this line of treatment has been carried out.

About a year ago I emptied the uterus of a physician's daughter who was near death's door when brought to the hospital. Two leading obstetricians saw her in consultation and both advised that the uterus should be emptied at once. She had been vomiting continuously since the beginning of her pregnancy. Both the specialists thought it was too late and that she would die in spite of treatment, but she finally pulled through and is now well. If she becomes pregnant again I shall certainly advise the dry food hoping that an abortion may be obviated.

DR. JOHN OSBORN POLAK, BROOKLYN, NEW YORK.—It has been generally admitted that whatever the cause of the toxemia is, the burden of it is thrown upon the liver, and we have hoped that routine blood chemistry would show us something about when to empty these uteri, because if the case is carried too long, whether the uterus is emptied or not, the pathology that has taken place in the central lobules of the liver is so destructive that sometimes it cannot be regenerated and death occurs.

Blood chemistry with us has been rather disappointing. The only thing that has come out of the study of blood chemistry has been the creatinine content, and the rise of that is an index as to the prognosis in these cases. That has kept pace as none of the other signs in the blood have done, with the clinical picture of the case. Where the creatinine content has risen and persistently so, notwithstanding the introduction of glucose into the vein and feeding, we have found that these patients become pregressively worse clinically as well as chemically.

There is one other point I want to bring out, and that is a suggestion made some time ago for direct blood transfusion of 300 c.c. in these cases, and I want to say that we have had three recoveries in what I considered absolutely hopeless cases from the clinical picture and the blood chemistry.

DR. H. WELLINGTON YATES, DETROIT, MICHIGAN.—I believe with Dr. Kosmak that there are definite instances in which the uterus must be emptied, and probably the creatinine estimation spoken of by the preceding speaker is a fair indication. I am sure also that the blood findings, as studied up to the present time, have taught us very little. We have found the urea content and the other blood findings the same after the uterus has been emptied as before in individual cases, so that in itself it is not an indication of whether we should or should not empty the uterus.

The point Dr. Kosmak has made is one of paramount importance, namely, it is a question entirely of dehydration. It is not a question of starvation except for fluids and if that fluid can be given in some way other than by mouth it should be done. To that end I believe it is highly important that all these cases, especially the grave ones, be hospitalized and absolutely under control.

Physiological chemists have recently brought out the fact that we have been using the word acidosis in a rather loose way, and that some of the cases we have attributed to acidosis have been really due to overalkalinity of the blood.

DR. WILLIAM M. BROWN, ROCHESTER, NEW YORK.—I used to be rather optimistic about these cases until I lost a few of them, and now I am afraid of every one of them. I cannot say that I have had quite such a convincing observation as Dr. Polak has reported in regard to the creatinine content. I have seen a number of cases where the creatinine has increased very materially, and the patient would turn around, have a therapeutic abortion, and get well.

DR. JAMES K. QUIGLEY, ROCHESTER, NEW YORK.—I feel that until we have some test of the hepatic function we are thrown back on clinical evidence absolutely. I have given up glucose intravenously for the particular reason that it has been disappointing. And I am afraid of the reaction from glucose. I would lay emphasis on the use of bromids *per rectum* and water given intravenously. Van Slyke has called attention to the danger in the use of morphia in cases of acidosis on account of its general effect on respiration.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—Regarding the creatinine content, it is important to differentiate between the patients who are nephritic and those who have no kidney involvement. If the creatinine content is on the increase in patients who are suffering from nephritis, it is not so dangerous as it is in those patients whose kidneys functionate properly.

It is impossible to generalize and put forth general rules to guide us in the treatment of the toxemias of pregnancy. However, any woman who has lost one-sixth of her weight as a result of vomiting of pregnancy is in danger. The loss of weight occurring in the early toxemia of pregnancy must be combated by solid foods in addition to the fluids the patients take. It is a mistake to restrict them to light foods and fluids only; in some instances these patients stand solid food better than fluids, and, really, the patient should be asked as to her preference for any particular kind of food and she should be given any food she desires.

The lower blood pressure is due to exhaustion. Low blood pressure always means a sluggish capillary circulation. The administration of digitalis and adrenalin very often will tend to raise the blood pressure and improve the general condition. Lutein extract, in my hands, did not benefit patients who suffered from pernicious vomiting of pregnancy, and I practically gave up its use in these cases.

DR. SPEIDEL (closing.)—My contention is that vomiting of pregnancy should receive more consideration in order that we may be called in consultation earlier. The cases manifesting extreme symptoms are generally the ones we see in consultation. We get these cases when they are so extreme that to interrupt pregnancy at that time means almost certain death; consequently in these extreme cases, as we have no positive way to determine whether pregnancy should be interrupted or not, we must at least relieve the patient in such a way that at the end of a definite time, if the disease has not been ameliorated, we should have her in a better condition for interruption of pregnancy than when we first saw her. It would seem that the glucose absorption test of Titus and Gibbons shows definitely whether the liver is able to reestablish itself or not. They have made postmortem examinations of cases of hyperemesis, and the liver in one case showed distinct regeneration of the liver cells due to the glucose injection. If Polak's suggestion of increase in creatinine is a better test then, where laboratory facilities are at hand it should be used. In many localities such laboratory facilities are not at hand, and in these cases we then have to depend upon definite treatment of some kind.

As Dr. Tate says, we have tried this and we have tried that, but have we tried them definitely and systematically from day to day, for that is the only proper way to test a remedy. You can try glucose today and corpus luteum tomorrow and never arrive at anything. It must be done systematically, and that is why I suggested this routine.

In regard to the use of dry food, I have always insisted upon the fact that when a patient is able to take food after the emesis has subsided, it should be dry food, such as shredded wheat biscuits, that must be chewed without the addition of water. Blood transfusion can be added to the suggestions that I have made. The routine is suggested merely as a basis. Irrigations of and instillations into the rectum and the introduction of glucose intravenously constitute the main features to carry the patient along for a short time, hoping that the condition may subside and the pregnancy will not have to be interrupted, or, at any rate, if it is to be interrupted that your patient is in as good, if not a better, condition than she was before treatment was instituted.

DR. WILLIAM SEAMAN BAINBRIDGE, New York N. Y., presented a paper entitled **Transplantation of the Human Ovary; Present Status and Future Possibilities.** (For original article see page 493.)

DISCUSSION

DR. CHARLES G. HEYD, NEW YORK CITY.—We had occasion at the Postgraduate to graft skin for a complete avulsion of the scalp. We used seventeen dif-

ferent skin donors and were quite surprised to find that the transplants from certain donors uniformly failed. In studying the factors of failure we came to the conclusion that all transplants, in a measure, followed the law of blood donors; that is, you would not obtain successful grafts of skin or of like tissue if there was a wide difference in the serologic reactions of donor and recipient. It is a peculiar biotic law that you must have serologic affinity to have successful transplants. That would seem to suggest a possible extension of the serologic law in its relation to sterility. It would be interesting to test out the wife and husband in relation to their blood group, and I think that in the future we will see an extension of the donor law—a similarity in serologic reaction as the basis of all successful transplants.

DR. ROBERT T. MORRIS, NEW YORK CITY.—The most important point brought out in Dr. Bainbridge's paper is the emphasis laid upon the donor law. By that rule we are going to find a way out of our unsuccessful grafting.

In regard to serologic affinity, I made a series of rabbits immune to each other's serum, and after having done that, I transplanted the ovaries and found that the grafts became absorbed even more quickly than before.

In regard to saving homoplastic grafts, replacing an ovary which has been removed, it is important to conserve the fallopian tubes as well. The oviduct in many cases, particularly in infective cases, ragged, torn, clubbed, with no opening, appears to be such a pathologic mess merely from the gross signs, that many surgeons have removed everything *en masse*. If you spare the ragged, torn, bleeding, clubbed oviduct, with no opening, split it from the cornu of the uterus to the clubbed tip, drop it back into the abdomen, wait three months, open again, you will often find fimbriae which were not present before. You will find furthermore that part of the oviduct, which was obstructed by hyperplastic connective tissue, will be lined with new conducting cells, and the oviduct may have assumed nearly normal form. That is a point that has been overlooked, and if we spare the oviducts in many cases in which an ovary and tube have been removed, and if, at the same time, we make heteroplastic or homoplastic ovarian grafts, we shall then not only retain the effect of the internal secretion from the graft, but also an increased opportunity for pregnancy. The only pregnancy I have had in a number of heteroplastic and hemoplastic graft cases happened after a heteroplastic graft in which the two individuals happened to be alike by donor law. The mother bore two children. That was the only pregnancy obtained in my series of experiments. It is not the pregnancy part that is so important, as the avoidance of sudden menopause and retention of endocrine power.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—In addition to the homoplastic and heteroplastic phase of the question, we have to bear in mind that the ovary is a deciduous organ. The age of the ovarian tissue ought to be considered and of course the age of the patient. Then there is the law of ultimate differentiation of tissue in the body, and the mixing up of connective tissue with epithelial elements in inflammatory and neoplastic changes would make it necessary for the expenditure of considerable tissue energy to restore the normal orderly arrangement. That I believe would interfere with successful growth.

It would appear that much more attention should be given to all tissue cultural conditions. If one may judge from the literature, this work has been done by simply placing a piece of ovarian tissue in a selected site where the blood supply can be expected to be good and become properly established. I am satisfied that is much more necessary to the ultimate success of this work.

DR. BAINBRIDGE (closing).—In my *Report on the Medical and Surgical Developments of the War* (U. S. Naval Medical Bulletin, January 1919), I referred

to work along this line done at Rouen during the war, where they had great success. Realizing the possibilities, I made this note in the Report: "If the donor law is to apply to the transplanting of skin, then when transplanting any tissue we should conform to the same law. It may be that this will make possible the successful transplanting of glands, like the ovary and thyroid."

While I believe the value of transplantation is very great, there is distinct danger that the exaggerated claims of the irregular practitioner, made public, will do harm in more ways than one. This must not deter us from a continuance of careful study and earnest investigation of the subject.

NEW YORK ACADEMY OF MEDICINE

SECTION OF OBSTETRICS AND GYNECOLOGY

STATED MEETING HELD DECEMBER 26, 1922.

DR. WILLIAM P. HEALY IN THE CHAIR

DR. ARTHUR STEIN reported **A Rare Type of Carcinoma in a Woman Twenty-nine Years of Age.** (For original article see page 539.)

DISCUSSION

DR. HARBECK HALSTED.—A somewhat similar case was admitted to the Sloane Hospital last July. There was a hard tumor in the left iliac fossa about the size of an egg and apparently attached to the iliac bone. No definite diagnosis was made. As the patient was in fairly good condition and was pregnant, operation was postponed. Finally, as the tumor continued to grow it was decided to perform an exploratory celiotomy.

Dr. Studdiford operated and found a tumor about the size of an orange, attached to the iliac bone and very hard except in the center, which had undergone necrosis. He found it impossible to remove the tumor, and therefore, only removed a small section for examination.

The tubes, ovaries and appendix were found normal and the uterus pregnant. The pathologic report stated that the growth was a squamous-cell carcinoma. The woman is still alive but in poor condition. Radium was used but produced no improvement.

DR. HAROLD C. BAILEY.—I operated upon a papillary adenocarcinoma of the ovary, and wiped away the metastatic growths that were found in the abdomen. Expecting that the woman would rapidly get worse I yet treated her very thoroughly with radium. She became practically well so that I was unable to palpate any mass in the abdomen, but after a year she returned with a well-marked growth in the groin, similar to the case reported tonight. The growth was filled with radium tubes and the patient improved, but I have no doubt that she has since died.

DR. M. R. ROBINSON.—The point of interest in the case is the difficulty of tracing the primary growth, if this tumor is to be considered secondary. It is also hardly conceivable that the few papillary growths at the fimbriated end of the left tube could be considered as the primary focus. The theory advanced that it may be a metastasis from a papillary growth of the right ovary, which had been removed some ten years previously, might be plausible if the present involvement had been

of the left ovary. In this case the ovary, as it appears in the report, was not affected, so that the metastasis must have taken a most unusual route. Another peculiarity of this tumor is that in spite of its pseudomucinous type it has developed downwards towards the retroperitoneal space instead of intra-abdominally as most of these tumors grow. It is my belief that this tumor is a primary pelvic growth and has no connection with the genitalia.

DR. W. P. HEALY.—We meet with unusually located tumors and when we consider their histology we must conclude that their origin is from congenitally displaced tissue. It has been interesting to note from time to time that we find metastatic growths in the groin from primary carcinoma of the cervix. It is not unusual to find these metastases breaking out in odd locations. It is quite possible that the ovary removed from Dr. Stein's patient might have contained the primary lesion.

DR. STEIN.—There might have been a primary tumor in the right ovary which was removed ten years ago. We know that cystadenocarcinoma recurs very late even when the primary growth has been very small. Olshausen and others have reported cases of late recurrence, for instance one 14 and the other 17 years after the primary growth had been removed. Once in a great while these recurrences appear on the side opposite that on which the original growth was situated and sometimes they recur retroperitoneally and in the inguinal glands. I think we may discard the probability that the tumor arose from the left tube because the tumor was a typical adenocarcinoma of the ovary. As there is also the possibility that there might have been a supernumerary ovary in which it originated, I am unable to say whether the tumor was primary or secondary.

I presented this case because it is an extremely rare occurrence when dealing with a squamous cell carcinoma to find the tube and ovary practically normal. The appendix also was normal. Do I understand that in the case cited by Dr. Halsted this was also the case?

DR. HALSTED.—I am sure the tubes, ovaries and appendix were normal in our case; though I did not perform the operation myself I was present and Dr. Studdiford examined them and stated that they were normal.

DR STEIN.—Dr. Bailey's case does not come into this group because in that case the ovaries were apparently the seat of an adenocarcinomatous change.

DR. JAMES A. CORSCADEN reported a case of **Paratyphoid Beta Infection of an Ovarian Cyst.** (For original article see page 545.)

DISCUSSION

DR. WARREN COLEMAN.—First from the standpoint of primary infection, I should be disposed to question whether this is a primary infection of an ovarian cyst. The same question arises in the case of so-called healthy typhoid carriers. In both instances it is assumed that the patient has never had typhoid fever. In infections of the biliary tract, including the gall bladder, there are two hypotheses: One is that the bacillus reaches the biliary passages through the common duct from the intestine; the other is that the bacillus reaches the biliary passages and gall bladder by way of the blood. In Dr. Corscaden's case there is only one way, it seems to me, by which the bacillus could have reached the cyst, that is by way of the blood stream. The idea that infection occurs by way of the lymphatics is not given much support at present. I believe that the so-called healthy typhoid car-

liers probably had a mild type of the disease lasting only a few days or possibly a week and which was not recognized. Some years ago while investigating the irregular types of typhoid fever at Bellevue Hospital we found numerous cases which lasted for only a week to ten days. It seems to me not improbable therefore that Dr. Corscaden's patient had this variety of typhoid fevers, and that the infection of the cyst was secondary.

The number of cases reported is small, but probably represents only a limited proportion of the cases which have occurred. The most complete study of this subject is found in an article by Lewis and LaConte in the *American Journal of Medical Sciences* in 1902. They refer to six or seven cases collected from the literature and report two of their own. Keen reports five cases. It is curious to note the number of these ovarian tumors which have turned out to be dermoid cysts and not ordinary cysts such as Dr. Corseaden has reported. (Dr. Coleman's case report follows).

Miss D. S., thirty-seven years old, unsatisfactory history, but the essential facts are clear. She was taken ill about the middle of October, but continued at work until November 14 when she fainted in her doctor's office and was sent at once to St. Bartholomew's Hospital where she was found to have a temperature of 104° F. The abdomen was distended and tenderness and rigidity in the right lower quadrant. The subsequent course of the disease was typical of typhoid. The Widal test was positive twice against B. typhosus in dilutions of 1.160, and negative for paratyphoid bacilli A and B. The stools were negative for B. typhosus on four occasions. The urine was negative. Vaginal smears were negative for the gonococcus.

On November 21, the abdomen became distended and the patient complained of excruciating cramp-like pains occurring intermittently, located for the most part in both lower quadrants, but at times referred to the epigastrium. The muscular rigidity was peculiar in that it was patchy in distribution: it was most marked in the right lower quadrant, less so in the left; and there was slight rigidity in the epigastrium. Free fluid could not be detected in the flanks. A point of interest is that the pulse rate was only 100, respirations only 16. The patient did not look as ill as the extent of the peritoneal involvement appeared to warrant. I made the diagnosis of acute peritonitis and recommended operation. Operation was performed within several hours. A little bloody fluid was found in the peritoneal cavity; the right Fallopian tube was large and inflamed, the left tube was less extensively involved. The right tube was removed, but there were so many adhesions about it, from previous disease, that it was ruptured in the removal. By this time the patient's condition had become so precarious that removal of the left tube was not attempted.

The typhoid bacillus was recovered in pure culture from the peritoneal fluid.

I thought it might be of interest to bring this case before you. It is not an infection of an ovarian cyst but an infection of the female genital tract, in this instance occurring during the course of typhoid fever.

DR. CORSCADEN.—I am very glad the question of a primary lesion has been taken up. Schottmüller discusses so-called gastroenteritis and says that through acute infections in the alimentary tract, the infection may finally lodge in a cyst. The case may very well have been a case of paratyphoid fever. The temperature rose to 104° F. and then fell gradually for a day, then shot up again to 104°, when the cyst may have become infected.

Dr. Harold Bailey presented a paper entitled **Consideration of the Causes of Stillbirth and Neonatal Death**, of which an abstract follows:

We have been told that obstetricians are responsible for 7 or 8 per cent of fetal deaths and the question is whether it is a just charge. I have attempted to find out just how much of this mortality we may justly be charged with and how much we are more or less improperly charged with.

In the first place the consideration of stillbirths and neonatal deaths should be changed so that under this heading we should start from the period of viability, and abortions and miscarriages should be excluded. A comparison of our statistics with state and city statistics is held up by the large abortion rate. The State certificate asks at what month the woman has arrived. It is difficult to do that. It would be better to take the period of viability or when the fetus weighs 1200 gm. and is 35 cm. in length.

The question also comes up whether we are not wasting time and money in our present methods of prenatal care and whether we have not done as much in the hospitals and clinics as can be done by a nursing service.

My paper presents a comparison of the figures of the Berwind Maternity Clinic and the Manhattan Maternity. The mortality rate of the Berwind Clinic for three years was 47 per thousand, and in the past year that figure has been reduced 10 per cent. One may say that the figures of out-door clinics are not suitable for comparison with those of hospitals, because the women who come to the out-door clinics are sturdier on the average than those in hospitals. In comparing the figures of the Berwind Clinic with those of the Manhattan Hospital it is amazing how closely they correspond. Among the clinic patients there were two cesarean sections in the hospital there were eight. The number of stillbirths is the same within 0.2 of one per cent. There was no patient discharged from the clinic whose subsequent history was not obtained and compiled in our records. At the Berwind Clinic there were 27 stillbirths and 15 neonatal deaths. In regard to the causes of death, three were due to dystocia and 15 or 1.5 per cent lost their lives from difficult labor. Out of the entire 27 stillbirths there were 15 fetuses that were macerated at the time labor began, so that of these 27 stillbirths there was a possibility of saving only 12 even with a perfect technic. There were three cases of syphilis, but none among the neonatal deaths. The majority of infants in this group of twelve lost their lives by cerebral hemorrhage. There were two cases of toxemia and one patient died of eclampsia.

In the 1000 cases at the Manhattan Maternity the stillbirth rate was 27.4 and the neonatal deaths numbered 32 instead of 15. This discrepancy is explained by the fact that there were seven major congenital anomalies that lived for only a short time. There were two babies, weighing 1½ pounds that lived for a little while. If one removed these cases from the list the difference in the figures for neonatal deaths would not show so great a discrepancy. This rate for congenital anomalies is excessively high. There is considerable credit due to the younger operators who work on the outside service for the fact that the figures are so nearly like those of the hospital.

If we take the figures in relation to the entire death rate at Berwind and at the Manhattan Maternity we find that at Berwind the mortality rate from dystocia is 35 per cent while at the Manhattan it is 26 per cent. These figures are considerably better than those given in a recent English study which gave the mortality as 51 per cent.

At the Manhattan Maternity the Wassermann was taken at the first visit and

there were only seven who had a reaction above 1+, and all were delivered of living babies. A 1+ reaction we do not recognize as a positive reaction and patients having such reports are not treated at the hospital. Instead of the 26 per cent of stillbirths and neonatal deaths due to syphilis as shown by Williams, we have 4½ per cent.

The mortality rate due to stillbirth and neonatal deaths at the Women's Hospital is given as 46 per 1000. Dr. Beck's figures show a mortality rate of 31.6. The difference is probably due to the fact that his start at the seventh month and end two weeks postpartum, while we carry ours through the entire month following delivery. I feel that our rates would be in the neighborhood of 30 if we were allowed to adjust them to the scale Dr. Beck has taken.

At the Manhattan we have found 26 per cent of the deaths due to prematurity, at Berwind 35 per cent were due to this cause. If we take New York State statistics outside of New York City we find a neonatal death rate of 42 to 46 per cent due to prematurity in the years 1920 and 1921. I believe prematurity is the greatest cause of disaster and that measures adopted to counteract this cause of mortality must be antenatal and intranatal.

SUMMARY

Certain facts stand out in the consideration of the deaths in these two clinics. In the adjoining districts covered by these institutions syphilis and toxemia play a minor part as a causation of fetal or neonatal deaths. Undoubtedly this is due to the close control of these patients in the prenatal clinics. Our efforts in prenatal care heretofore have been directed largely toward the correction of these two etiologic causes and now, having been successful in a régime which does alter this factor, it would seem as if we must turn our efforts into another line. Another impressive fact concerning this study is that from an operative standpoint we still have a field for improvement.

The prevention of prematurity and the care of the premature in the neonatal period offer us new problems and in a field almost untouched and apparently one in which we might accomplish a great deal. In the first place these women must come to our prenatal clinics earlier in pregnancy and it must be clearly understood that the possibilities of disaster as regards the fetus are as great in the seventh and eighth month of pregnancy as at term.

It is a question whether we should continue with the nursing prenatal care as at present conducted. Should we not substitute the care of well-trained physicians to the solving of this intricate and difficult problem? The probabilities are that more will be accomplished by a thorough social service nursing régime and with the patients brought into the clinic much more frequently than is now the custom. In those instances where the patient is unable to come because of illness, she should be visited by a physician from the clinic or removed to the hospital.

Those patients showing a trace of albumin in their urine must be considered as abnormal and their metabolism should be studied in the most thorough manner. A laboratory should be established in every prenatal clinic and hospital beds should be provided where such studies may be properly conducted. While it is impossible to consider the hospitalization of a majority of these women, rest and freedom from exertion should be provided by admitting to their homes prenatal workers of the mother's aid type, so that the general housework may be lightened for them.

The premature infant should be looked after by the trained pediatrician. Some of the most difficult problems in physiology and pathology present themselves in this group and these infants at present are cared for by the obstetrician whose mind must be filled with the problems of pregnancy and labor.

The association of the obstetrician and the pediatrician should be a close one but the entire charge of the newborn, whether premature or not, should be in the hands of the latter. This ideal arrangement is already working in several hospitals. If the obstetrician had the number of his patients cut nearly in half in this way, he might find time to investigate the problem relating to the production of premature birth.

CONCLUSIONS

The fetal mortality of childbirth is due to several causes but prematurity stands foremost, with trauma due to dystocia as a close second. In order to prevent these deaths from prematurity, and it must be recalled that they occur in the antenatal, intranatal and neonatal periods, the present methods of prenatal service could be of very little use. The best trained minds must be at our service and the biochemist and the internist should give us aid in ascertaining the causes for this premature emptying of the uterus. Possibly a low grade toxemia causes degeneration of the placenta and is thus the origin of the trouble. Premature infants do not stand operative trauma and in all abnormal deliveries this should be taken into consideration. The postnatal care of those that survive should be placed in the hands of competent pediatricians.

On the east side of Manhattan, syphilis is not a common cause of stillbirth or death during the first month of life. The incidence was 4.5 per cent of all such deaths in the two institutions during the 11 months of the year.

Abortions and miscarriages should be separated in the health reports from those deaths that occur after the period of viability and the weight and length of the fetus should be the determining factor.

DISCUSSION

DR. HALSTED.—I looked up our statistics at Sloane for several years and then gave it up because I came to the conclusion that we had no common ground for comparison whatever. One hospital reported 85 deaths per thousand and another 31. If all of the first class maternity hospitals had the same basis for compiling their statistics their figures would be about the same but at present they use such different standards that we cannot compare their figures at all.

I feel sure that a mortality rate as low as Dr. Beck's will be reached if we apply his scale. Our figures are higher than his but we used the present Board of Health rule which is any fetus born dead no matter what the month of gestation is considered a stillbirth.

DR. ALFRED C. BECK.—The mortality rates reported by Dr. Polak and myself are not too low. We hope to be able to even further reduce them. In my opinion the average infant mortality should be between 1 per cent and 2 per cent.

While these figures are much better than those reported by Dr. Bailey they do not indicate that we are doing better obstetrics in Brooklyn, as the statistician referred to by Dr. Bailey would have you believe. I believe that Dr. Bailey's figures would be as good as those reported by us if he had prepared his statistics as I did.

Until we have a common standard we will not be able to learn much from these statistical papers. If each hospital includes in its report all of the cases admitted to its service the statistics will be of very little value. As we all know, some institutions are merely dumping grounds for the neglected and mismanaged cases of midwives and poor practitioners. Other hospitals have a very small number of such cases. A most excellent obstetrical staff working in an institution whose patients consist mostly of those neglected cases will not show as good end results as those obtained by mediocre men whose material is of a better grade.

My paper which was read at the Boston meeting of the Am. Med. Assn. was prepared for three purposes: The first was to show the value of prenatal work.

The second was to show the infant and maternal mortality that might be expected in general, if prenatal work were done, and not the results that should be obtained in hospital practice where the percentage of difficult cases is much larger.

The third was to show a method of preparing statistics which would enable us to compare the results of the routines employed in various institutions. In other words I hoped that I was suggesting a common ground for the preparation of these statistical studies.

All of the cases included in my analyses were seen by us before the onset of labor. If all of us in the preparation of our statistics would exclude the neglected cases which enter our service late in labor when the risk to both mother and child is great irrespective of the method of treatment employed we then would be able to compare and discuss intelligently the plans of organization that are used in various institutions and profit by the routines that are described.

In addition to excluding all cases that were not seen before the onset of labor I also excluded all premature labors that resulted in the birth of infants under 1500 gm. While the figure given by Dr. Bailey, namely 1200 gm. is that which is usually given as the minimum from the standpoint of viability, I feel that in a study of this kind 1200 gm. is altogether too low as most of the prematures this small have very little chance of surviving. On the other hand we can save a large percentage of those over 1500 gm., if we give them proper care. This higher level for prematures no doubt also accounts for a part of the discrepancy between our figures and those of Dr. Bailey.

In my paper all infant deaths under two weeks were included. This period was chosen because our patients are discharged fourteen days after delivery. Our experience with those who can be followed up has shown that very few deaths that occur between the fourteenth day and the end of the first month are due to obstetric difficulties. For this reason I feel that fourteen days rather than one month is a better standard for statistical study of neonatal deaths due to obstetric causes. For the same reason I believe that Dr. Bailey's inclusion of the first month rather than the first two weeks is not responsible to any great degree for the difference in our figures.

Since writing my paper in which I aimed to suggest the standards which I have already mentioned, it has occurred to me that in addition to these suggestions we must note the proportion of primiparae and multiparae in our service.

As Dr. Bailey and I did not use the same standard in the preparation of our statistics it seems quite unfair for anyone to compare his higher mortality with that reported by Dr. Polak and myself.

For a number of years we have been trying to lower our infant mortality. About ten years ago we lost something like 70 per thousand. This figure was cut to 50 per thousand and later 45 per thousand. As Dr. Bailey has stated in our last two analyses the rates were 25 and about 30 per thousand.

Some of the things which I believe have greatly lowered our infant mortality are:

(1) The delivery of only multiparae on our outpatient service. All primiparae are delivered in the hospital. As a result of this, routine intervention in the interest of the child is practiced as soon as the indication arises. If the fetal heart shows evidence of asphyxia it is not necessary to wait for the appearance of the attending obstetrician. Our resident obstetrician delivers these patients without this delay.

(2) No patient is delivered by the outpatient service unless she has been previously examined in our prenatal clinic.

(3) Syphilis is looked for by means of serologic examination and vigorously treated regardless of the period of gestation.

(4) The prenatal nurses who visit our patients in their homes by their advice and assistance have greatly diminished the incidence of premature deliveries. In addition to diminishing the actual number of premature deliveries we believe that the help of these nurses has resulted in the birth of larger and better developed prematures when they do occur. While I agree with Dr. Bailey in the necessity for the physician's examination and advice in the prenatal clinic I, at the same time feel, that the nurses' service are indispensable. The nurses work under the supervision of the physician in charge of the clinic. They are advised concerning the various cases in their particular districts and through their cooperation this advice is followed much better than it was in the days when we had no prenatal nurses.

(5) Stripping of the breasts has furnished us with another means of cutting down the infant mortality. By the use of this routine we obtain maternal milk not only for our premature infants but for those who do not receive either sufficient or proper milk from their own mothers.

DR. BAILEY (closing).—The particular points that I want to make in this paper are (1) the need for the prevention of premature births at the seventh and eighth months, and (2) the need for combined action in regard to the basis of our statistics, so that statisticians and obstetricians may start at the same point. Cases of abortion and miscarriage should be separated from those occurring after the period of viability and the length of the fetus should be determined so that we should all be talking about the same thing. Perhaps too much emphasis has been placed on Dr. Beck's high record which has been held up to us by statisticians. These figures have been broadcasted before the laity and statements made that imply that obstetricians have been derelict. It should be made known that there is no common ground on which the statistics of different institutions are based and that we are not talking about the same thing. If we took into consideration the weight and length of the fetus as a starting point and the four weeks' postpartum period our statistics would balance. I feel that we are using the prenatal service in the same way and that our results are equally good in either institution.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

The Physiology and Pathology of the Endometrium

By Reinhard E. Wobus, M.D., F.A.C.S., St. Louis, Mo.

CHANGES INCIDENT TO THE MENSTRUAL CYCLE

BY having demonstrated that many of the conditions of the endo-
metrium formerly considered pathologic are simply expressions
of various stages of the menstrual cycle, Hitschmann and Adler have
revolutionized our conception of its pathology, and have added
greatly to our understanding of its physiology. Such terms as atro-
phic, hypertrophic and hemorrhagic endometritis have become prac-
tically obsolete and the term endometritis has been much restricted,
as the round cell infiltration which was formerly considered a sign
of inflammation, has been shown to be physiologic at certain periods
of the cycle.

Most investigators in this field since that time have endeavored to
amplify and, only in a few instances, have contradicted some details
of Hitschmann and Adler's conclusions. While they believed, e.g.,
that the endometrial glands simply shrink after the plethora has been
relieved by the menstrual bleeding, Schröder and others have shown
that there is an actual desquamation of all except the lower layers
of the endometrium at menstruation, exactly as it occurs in those of
the lower animals which menstruate. The remaining or basal layer
then hypertrophies to 4 or 5 times its original thickness before the
next menstrual flow. Schröder's view is supported by Driessen,
Meyer-Rüegg, Robert Meyer, Lahm, Döderlein, Minot and Marshall,
while Cullen, Findley, Möricke, Strassmann, and Williams believe
that any loss of epithelium is merely incidental. That there is an
active and constant desquamation of the endometrium at menstrua-
tion, however, seems to be an established fact, as Wyder, Driessen,
van der Leyen and, more recently, Kate Lindner, regularly found
epithelial fragments in the menstrual blood, especially on the first
and second days. The latter examined repeatedly the menstrual dis-
charges of 15 virgins who menstruated regularly. In all cases she
found various glandular and cellular elements in the menstrual flow.
The fragments were up to 4 cm. in length and both the compact and
spongy layers could be demonstrated. There was no case of mem-
branous dysmenorrhea in the series nor was there any connection
between the size of the flakes and an existing dysmenorrhea. Blood
clots, however, accompanied dysmenorrhea in 8 out of 9 cases. From

a study of a series of uteri removed at the time of menstruation, either at operation or postmortem, Meyer-Rüegg concludes that this desquamation, under normal conditions, occurs gradually and consists of a slow degeneration and partial digestion of the cells.

It is generally conceded that normal uterine tonus is essential for the limitation of the amount of the menstrual bleeding. Even during normal menstruation the uterus contracts rhythmically to a certain extent. If, for any reason, these contractions become violent, they manifest themselves as menstrual cramps. Meyer-Rüegg believes that the endometrial swelling incident to menstruation may occlude a narrow uterine lumen and thus give rise to violent contractions. Under these conditions the entire menstrual decidua may be cast off *en masse,* thus producing the condition known as membranous dysmenorrhea.

Allen has shown that a similar desquamation occurs in the squamous epithelial lining of the vagina in mice. In the first part of the oestrous cycle this epithelium proliferates until it is twice or three times its interval thickness. In the latter half it shows considerable infiltration by leucocytes and round cells, similar to the condition of the premenstrual endometrium in women.

THE PROBABLE CAUSE OF MENSTRUATION

Schröder, among others, believes that menstruation is caused directly by the death of the ovum. It is generally conceded that the ripening graafian follicle is responsible for the premenstrual or pregravid hyperplasia of the endometrium, thus preparing a suitable bed for the reception of the ovum discharged from the ruptured follicle. If the ovum dies, there is no further use for this nidus and it disappears. Seitz and Ruge, however, express doubt in the plausibility of Schröder's theory. It seems hardly conceivable that a single cell, floating somewhere between the ovary and uterus, could have any such direct effect on the endometrium. Besides, if ovulation always occurred on the same day of the cycle, which it probably does not, it is questionable whether the ovum would always live the same number of days after its liberation. This would have to be the case if Schröder's explanation of the origin of the menstrual flow were correct. Counting the beginning of the cycle from the first day of menstruation, ovulation takes place, according to Schröder, on the fifteenth or sixteenth day; according to Seitz, and Miller, on the fourteenth day; according to Villemin, between the twelfth and fourteenth day; according to Szymanovics, between the seventeenth and nineteenth; and according to Fränkel, on the nineteenth day. Schickelé gives the probable day of ovulation at one week after menstruation, while Tschirdewahn has observed it from the tenth to the twenty-sixth day of the cycle.

The effect of the corpus luteum on the menstrual cycle has not been definitely settled. To begin with, there is no unanimity as to the application of the term corpus luteum. While most authors apply this term to the follicle as soon as it has ruptured, Adler, Aschner, Bueura, and Schauta speak of a corpus luteum only after the development of its characteristic yellow color. This yellow pigment which, by the way, occurs only in woman and the cow, has been

found by Escher to be identical with carotin, the coloring matter in carrots.

While mere ripening of the graafian follicle causes hyperplasia of the endometrium, the corpus luteum resulting from its rupture is thought to cause the uterine glands to secrete. This secretion consists of glyconin, albuminous substances and fat which are thought to furnish nourishment for the impregnated ovum before the development of the chorion. From the work of Loeb, Prenant, Skrobanski, and Papanicolaou, as well as the publications of Halban and Koehler, it would appear that the corpus luteum inhibits menstruation. The removal of the corpus luteum in the latter part of the menstrual cycle brings on uterine bleeding within two or three days, both in woman and some of the lower animals. Unfortunately, in none of the cases so far reported, was a microscopic examination made of the endometrium, wherefore Schröder doubts whether the resulting bleeding is in reality a menstrual flow. Ehrenfest feels that the latter is proved by the fact that, in a number of cases which he has observed, the succeeding flow appeared twenty-eight days later. In other words, the removal of the ovary containing the corpus luteum establishes a new menstrual cycle. Villemin, Ancel, Bouin, and Szymanowics, on the other hand, still support the view of Pflüger, who claimed that the corpus luteum causes menstruation. This is denied by Pauchet, and Schickelé. Allen has shown that, in the mouse at least, the corpus luteum can have no definite effect upon metoestrum as it does not reach its maturity until some time after oestrus so that, in mice which ovulate spontaneously, two or three sets of corpora lutea may be present at one time; in mice which do not ovulate spontaneously, corpora lutea may be entirely absent, and yet normal oestrus cycles are experienced in both types of animals.

That the corpus luteum is necessary for decidua formation in the guinea pig, has been demonstrated by Loeb, who produced decidual reaction in the endometrium by the introduction of foreign bodies into the uterus. This reaction, however, took place only in the presence of an active corpus luteum.

It is generally conceded that the corpus luteum does inhibit ovulation. Sterility has been noted in persistent corpus luteum cysts. That such is not the case, at any rate in mice, has been shown by Allen. While the oestrus cycle of the mouse is about four days, the corpus luteum does not reach its maturity short of eight days and persists for at least eight days more, so there are always present two or three sets of corpora lutea in the ovaries of a mouse with regular oestrus cycles. The cow, also, ovulates from 3 to 10 times during the existence of one corpus luteum. Schickelé thinks that, while development of the corpus luteum and activity of the endometrium usually coincide, they are not necessarily interdependent. He avers that normal menstruation may occur in the absence of a corpus luteum as Allen has shown that metoestrous changes occur in its absence in mice which do not ovulate spontaneously. Vignes explains menstruation on a chemical basis and believes that the ovary contains several hormones. From other sources it has been suggested that corpus luteum formation and menstruation may be the result

of a common factor. Tuffier produced menstruation in two amenor-
rheic women by injecting 20 c.c. of blood taken from two other
women at the beginning of their menstrual flow.

CAUSES OF PATHOLOGIC BLEEDING

"Since, without doubt, the ovaries regulate the normal period, it
is only consequential to make them responsible for pathologic bleed-
ing also." This quotation of Adler expresses pretty well the opinion
at present generally held on this subject. Adler had previously
demonstrated that salpingitis and even endometritis, by themselves,
never give rise to uterine bleeding, which occurs only after the in-
flammatory process has reached the ovary. Inflammatory congestion
of this organ hastens the ripening of the graafian follicles and thereby
shortens the menstrual cycle. Like many other investigators, he be-
lieves that other endocrine organs, notably the thyroid, also come
into play. Since the ripening of the graafian follicles causes a physio-
logic hyperplasia of the endometrium, it is conceivable that, in cases
where the follicles do not rupture, this hyperplasia may reach ab-
normal proportions. Schröder, who has studied this subject most
thoroughly, found that in every case of glandular hyperplasia there
existed ripe or over-ripe follicles in the ovaries. De Rouville and
Sappey found in those over-ripe or cystic follicles which apparently
caused uterine bleeding, a change in the theca interna cells. These
cells were enlarged and more hyaline and approached in appearance
corpus luteum cells. Geist reports the same findings. In no case
of true glandular hyperplasia, however, did Schröder find a corpus
luteum. Geist reports a typical case of this kind. Adler, Ascher,
and Schauta have called attention to the absence of corpora lutea
in climacteric bleeding.

Schröder encountered most of his cases of glandular hyperplasia
in women nearing the menopause, in fact, he asserts that this con-
dition does not occur before the age of 35 years. Novak, on the
other hand, thinks it may occur at any time during the sexual life
of women and has encountered it in a girl of 12 years. My own
observations are in accord with those of Novak. Schröder further
restricts the diagnosis to cases where the normal cycle has been sup-
planted by irregular beeding.

GLANDULAR HYPERPLASIA AND ALLIED CONDITIONS

Glandular hyperplasia, which was first described by Cullen in 1900,
presents a very characteristic picture microscopically. The glands
are large, numerous and often tortuous; some of these are markedly
dilated and apparently cystic, though there is no actual distention
as the epithelium is not flattened. The stroma is usually rather com-
pact and traversed by numerous large capillaries. The enlarged
glands traverse the entire thickness of the endometrium, there being
no division into three distinct layers as in the premenstrual mucosa.
The bleeding is not caused by desquamation as in the menstruating
mucosa, but is localized and caused, as Schröder suggests, by necro-
biosis. Fränkl assumes that the hyperplasia is due directly to hy-
peremia and the bleeding due to blood stasis in, what he terms, the
plexus venosus varicosus endometrii. He thinks there is usually an

accompanying hyperplasia of the myometrium. That a separate hyperplasia of the myometrium may exist due to ovarian hyperfunction is the opinion of a number of authorities. The idea that many cases of so-called functional or idiopathic uterine bleeding without, at least, macroscopic changes except possibly some enlargement, are due to ovarian activity, is gradually gaining ground. These so-called metropathies are treated with radium or the x-ray in order to bring about at least a partial sclerosis of the ovaries. Hegar believes that even fibroids are caused by ovarian dysfunction and calls attention to the frequency with which cystic ovaries are found in cases of uterine fibroids. It is also noteworthy in this connection that glandular hyperplasia is common in fibroid uteri.

It must be borne in mind that no definite line of demarkation exists between the normal premenstrual endometrium and hyperplasia. To make the diagnosis, specimens should be taken during the interval, as a degree of hyperplasia which would be normal in the premenstrual stage, would be abnormal in the interval, even if it did not exactly meet Schröder's classification. Apart from glandular hyperplasia, Whitehouse calls attention to a condition which he regards as due to an hyperactivity of the endometrium. He has noticed that, in certain cases of prolonged or irregular uterine bleeding, the endometrium does not uniformly exhibit any definite stage of the cycle, but that some parts may represent the premenstrual, others may represent the menstruating or postmenstrual stage. I have been able to substantiate these findings in some of my specimens. Frank, however, thinks that an uneven development of the endometrium may be quite normal.

In portions of an hyperplastic endometrium the glands are sometimes so closely packed, and with so little intervening stroma, as to suggest adenoma. I have encountered several specimens in the past year in which the diagnosis was indeed difficult. It is significant that in all these cases the endometrium was removed from fibroid uteri at the time of the introduction of radium. Robert Meyer has found transitional types in carcinoma which make it appear probable that cancer may develop on the basis of a hyperplasia.

OTHER HYPERPLASTIC CONDITIONS

Polyps and polypoid hyperplasia are apparently distinct entities which have no connection with glandular hyperplasia. These processes are always more or less localized and the remaining endometrium is usually quite normal. They have their origin in the basal layer. Their etiology is not understood at present. Menge has noted a polypoid condition which tends to involve more or less the entire endometrium and which he terms benign adenoma of matrons as he has encountered it only after the menopause. Zimmermann asserts that the so-called psoriasis of the endometrium, in which the cylindrical epithelium covering is partly changed to squamous epithelium, is caused by long continued inflammatory action. Robert Meyer has encountered squamous epithelium in the endometrium only in carcinoma. These findings are exceedingly rare.

Among the rarer observations may also be mentioned papilloma of the endometrium which Robert Meyer has always found to be malig-

nant, while in the cervix, where it occurs relatively more frequent, it is practically always benign.

Acute infectious endometritis is today a well defined condition which offers all the characteristics of an acute infectious process in any other mucosa. Lahm, however, maintains that certain types of endometritis postabortum are not due to an infection, but to chemical irritation caused by the products of necrobiosis of remnants of the ovum. In these cases he noticed an overwhelming infiltration with leucocytes, lymphocytes and plasma cells. In other cases again, he observed "infarcted shreds, infiltrated by leukocytes," which he interprets as an incomplete menstruation. He believes that even remnants of the ovum exert a protecting influence on the corpus luteum and thereby cause interference with the maturation of follicles and are, finally, responsible for an endometrial hyperplasia.

The problem of chronic endometritis, however, is still in a somewhat unsettled state. It is conceded to be a rather infrequent condition although, due to the difficulty in making an exact diagnosis, wide variations as to its incidence have been expressed. While Cullen was able to make the diagnosis in only 48 out of 1800 endometria examined, Schwarz and Kohlbry assert they encountered it 70 times in examining 305 endometria. Such a divergance can only be explained by a difference in the conception of the term. The main difficulty lies in the fact that there is normally an infiltration of the endometrium by lymphocytes and even leucocytes in the premenstrual stage, so that the diagnosis cannot be made unless the endometrium is in a state of rest. When found, it is quite frequently associated with chronic purulent infection of the adnexa. Chronic inflammation, even tuberculosis of the endometrium, does not interfere with the normal cyclical changes of the mucosa. The glands are practically unaltered, and if hyperplasia exists, it is simply coincidental.

The dictum of Hitschmann and Adler that the diagnosis of chronic endometritis can be made only when plasma cells are present, seems generally accepted. Mönch thinks that a diffuse infiltration with round cells would indicate inflammation, while if they are found in closely packed round or oval masses, they represent the so-called endometrial lymph nodes, comparable to those found in the intestines. Against this, it has been argued that these "lymph nodes" are never found in the normal endometrium. This has been disputed however by good authority. Certainly, they are very common. They always lie in the basal layer, while the diffuse infiltration may extend through the entire mucosa.

The scarcity of true chronic endometritis is accounted for by the fact that the mucosa is shed once a month. For this reason, also, chronic inflammatory reaction is more common in the basal layer. Curtis examined 118 endometria from uteri removed at operation for bacteria. By most painstaking methods he was able to obtain growths in 17. Four of these had had recent intrauterine manipulations. Including these, 10 showed histologic evidence of infection. In three cases of distinct endometritis, no growth was obtained. As stated

before, chronic endometritis occurs most often in connection with chronic infection of the adnexa. It is not rare in uteri containing fibroids and frequently accompanies uterine carcinoma. In senile uteri, a form of endometritis sometimes develops which tends to the formation of pyometra. In these cases the entire mucosa may be replaced by a pyogenic membrane.

NUTRITIONAL CHANGES

In the so-called "war amenorrhea" which occurred commonly in Germany and Austria during the latter part of the war, it was found that the amenorrhea was caused by definite glandular changes in the endometrium. This is in keeping with the work of Loeb, and of Reynolds and Macomber, who showed that definite changes in the ovaries of lower animals could be produced by a deficient diet. Novak and Graff, however, have demonstrated that, at least in some cases of war amenorrhea ovulation does continue, as they were able to show cyclic changes in these endometria.

BIBLIOGRAPHY

Adler: Wien. klin. Wchnschr., 1921, xxxiv, 378. *Allen:* Am. Jour. Anatomy, 1922, xxx, 297. *Cullen:* Cancer of the Uterus, 1900, Ann. of Gyn. and Pediatrics. 1904, xvii, 413. *Curtis:* Surg. Gynec. and Obst., 1918, xxvi, 178. *De Rouville and Sappey:* Gynec. et Obst., 1922, v. 1. *Geist:* Jour. Am. Med. Assn., 1922. lxxviii, 1185. *Frank:* Gynec. and Obst. Pathology, Appleton Co., New York, 1922. *Fränkl:* Monatschr. f. Geburtsh. u. Gynäk., 1915, xlii, 139. Dublin Jour. Med .Sc., 1921, xxi, 481. *Hobb:* Brit. Med. Jour., 1921, ii, 38. *Lahm:* Zentralbl. f. Gynäk., 1920, xliv, 914. *Lauth:* Monatschr. f. Geburtsh. u. Gynäk., 1915, xlii, 36. *Lindner:* Monatschr. f. Geburtsh. u. Gynäk., 1922, lvii, 119. *Mauthner:* Monatschr. f. Geburtsh. u. Gynäk., 1921, liv, 81. *Menge:* Zentralbl. f. Gynäk., 1922, xlvi, 1. *Meyer:* Arch. f. Gynäk., 1917, cvii, 182; Ztschr. f. Geburtsh. u. Gynäk., 1922, lxxxv, 44. *Meyer-Rüegg:* Arch. f. Gynäk., 1919, cx, 274. *Mönch:* Arch. f. Gynäk., 1918, cviii, 483. *Novak:* Menstruation and Its Disorders, Appleton Co., New York, 1921; Jour. Am. Med. Assn., 1920, lxxv, 292; Am. Jour. Obst., 1917, lxxv, 996. *Novak and Graff:* Ztschr. f. Geburtsh. u. Gynäk., 1921, lxxxiii, 289 and 502. *Schickelé:* Gynec. et Obst., 1921, iii, 170. *Schröder:* Arch. f. Gynäk., 1915, civ, 27; ibid, 1919, cx , 589; Zentralbl. f. Gynäk., 1918, xlii, 633; Klin. med., Wchnschr., 1922, i, 403. *Schwarz:* Am. Jour. Obst., 1919, lxxix, 63. *Schwarz and Kohlbry:* Jour. Mo. State Med. Assn., 1919, xvi, 209. *Seitz:* Zentralbl. f. Gynäk., 1918, xlii, 838. *Sudakoff:* Monatschr. f. Geburtsh. u. Gynäk., 1914, xl, 101. *Tschirdewahn:* Ztschr. f. Geburtsh. u. Gynäk., 1920, lxxxiii, 110. *Szymanowics:* Gynec. et Obst., 1922, v, 129. *Tuffier:* Bul. de l'Acad. de Med., 1921, lxxxv, 99. *Vignes:* Abstr. Am. Jour. Obst., 1916, lxxiv, 711. *Whitehouse:* Brit. Med. Jour., 1921, ii, 981. *Zietschmann:* Arch. f. Gynäk., 1921, cxv, 1. *Zimmermann:* Zentralbl. f. Gynäk., 1921, xlv, 238.

Selected Abstracts

Uterine Malpositions

Findley: Frequency and Clinical Significance of Displacements of the Uterus.
Journal American Medical Association. 1922, lxxix, 795.

In order to determine the significance of uterine displacements, Findley reviewed 3,763 records of private gynecologic patients. In this series he found 480 cases of retroversion or retroflexion and 70 cases of prolapsus. This means one case of malposition in seven gynecologic patients.

Of the 480 cases of retrodisplacement, he found only 20, or about 4 per cent, to be free from complications. He, therefore, concludes that any symptoms which may be present, are caused by the complications and not by the retrodisplacement, and that indications for operation rest upon the associated complications and not upon the retrodisplacement itself. He believes that retrodisplacement alone never causes congestion and consequent leucorrhea, dysmenorrhea or metrorrhagia. He does admit, however, that in a small number of cases, retrodisplacement may cause sterility but thinks that, here too, the sterility is usually due to accompanying disorders.

The only importance he attaches to retrodisplacement is as a factor in the production of prolapse. R. E. Wobus.

Bullard: Gynecological Backache. New York Medical Journal, 1921, cxiii, 142.

In a series of 721 cases of backache with various gynecologic lesions studied at the Women's Hospital in New York; 85 per cent were cured by an appropriate operation. About 15 per cent of this series, presenting one or more of the common gynecologic causes of backache, were not relieved of this symptom by anatomically satisfactory operations, thus demonstrating that in these cases the gynecologic pathology was not the cause of the backache; 15-20 per cent of women with lesions commonly considered as causes of backache, as retroversions, prolapse, pelvic inflammations, obstetrical lacerations, or pelvic tumors, had never had this symptom. This analysis indicates that more careful study is required for the diagnosis and proper treatment of backache in women. Margaret Schulze.

Stacy: Anteposition and Retroposition of the Uterus. Journal American Medical Association, 1922, lxxix, 793.

Stacy studied 1000 consecutive cases of unmarried women aged from 15 to 45 years who applied at the Mayo Clinic for various disorders, to determine the frequency of malpositions. As none of these women had any record of pelvic infection, pelvic tumor or pregnancy, it is presumable that the cases of retroversion encountered were congenital.

In agreement with Polak's findings, she discovered retrodisplacement in 202 or 20.2 per cent of the women examined. She found no symptoms referable to the retroposition, nor any marked effect on menstruation. There was, however, a slightly greater incidence of dysmenorrhea and of profuse menstruation in the women with retrodisplacement. R. E. Wobus.

Kelly and Fricke: The Use of Pessaries. Therapeutic Gazette, 1921, xlv, 5.

A brief introduction on the development of the pessary in its various forms precedes this essay on the various uses of the pessary. While its use has greatly decreased in recent years, it is the belief of the authors that it still has a modest place. As a mechanical device to permanently correct displacements the pessary is no longer employed, but simply to take up a certain amount of slack in the vagina and to prevent further downward sagging onto the pelvic floor, in this way relieving the dragging sensation. The authors believe descensus to be the important factor and whether or not the pessary is likely to help the patient depends on whether she has any decided descensus or not. Where the discomfort is marked, operation is advised. If the outlet is good, however, a pessary may give great relief and the patient either escapes or postpones an operation.

The best form of pessary is the simple ring made of hard rubber large enough to stretch the vaginal walls and take up slack, but not to make a tight fit. Next

to the single ring pessary they find the Hodge pessary most useful. The Gehrung pessary is advised for cases in which the anterior wall of the vagina pouts out. It is worn with the cervix resting between the two limbs of the double U.

In cases of well defined prolapse of the uterus with eversion of the anterior and posterior walls, the cervix lying at or near the orifice, but having a fair support at the vaginal outlet, various procedures are recommended. A glass ball may give excellent support and should fit snugly but not tightly. The Menge pessary which has a detachable stem may be used to advantage in this type of case.

The dangers in the use of pessaries, and especially the use of too tight a pessary, and the possible spread of gonorrhea and syphilis by the use of unsterile pessaries is pointed out. The writers advise the discarding of soft rubber and air inflated pessaries because of the frequency with which they provoke irritating secretions and cause leucorrhea. Patients wearing a pessary should use a daily douche consisting of a teaspoonful of salt in a pint of water. Removal of the pessary during menstruation is unnecessary but this procedure is advised for a few days every three or four months.   NORMAN F. MILLER.

Mock: **So-called Traumatic Displacement of the Uterus.** Journal American Medical Association, 1922, lxxix, 797.

Mock has gone rather exhaustively into the question of traumatic displacement of the uterus which is not infrequently made a cause for action in damage suits against railways and industrial corporations. He arrives at the following conclusions: (1.) Acute, temporary displacement of the uterus may follow trauma, but the symptoms are so severe as to call for immediate relief. The disability is, therefore, of short duration. (2.) Permanent uterine displacements are never due to trauma *per se*. (3.) Trauma may cause an exaggeration of an existing and unrecognized displacement, but careful study will always demonstrate that the chief etiologic factor is some combination of pre-existing conditions.

R. E. WOBUS.

Baldwin: **The Artery of the Uterine Round Ligament.** Surgery, Gynecology and Obstetrics, 1920, xxxi, 57.

Contrary to the usually accepted idea, Baldwin asserts that there is no artery of any consequence coursing in the round ligament to form a part of the blood supply of the uterus. There are a number of small arteries in the ligament just sufficient in size to nourish it and, unless these are enlarged by disease, the round ligament may be cut without any appreciable hemorrhage.

Only a small branch of the artery of the round ligament, corresponding to the external spermatic in the male, accompanies the ligament inward from the inguinal canal. This branch anastomoses with branches from the arch formed by the uterine and ovarian arteries. Additional blood supply is furnished by the funicular artery, a slender branch of the superior or, occasionally, the inferior vesical artery. It anastomoses with branches from the uterine, ovarian, inferior epigastric and external pudendal arteries.   R. E. WOBUS.

Fairbairn, J. S.: **Minor Displacements of the Uterus as a Cause of Disability in Women.** British Medical Journal, April 15, 1922, 587.

Some of the symptoms commonly ascribed to backward displacement of the uterus are backache, bearing down, menorrhagia, leucorrhea, dysmenorrhea, disturbances of micturition, pressure on the rectum, dyspareunia, general disturbances, such as headache, sickness, indigestion, and abdominal pain. The author calls

attention very earnestly to the fact that these symptoms should not be attributed to the misplaced uterus without most careful consideration of other possible causes, and summarizes his paper as follows:

(1) Always look beyond the mere position of the uterus and do not ascribe symptoms to retroversion. (2) In retroversion accompanying pelvic floor prolapse, subinvolution, pelvic inflammation, and tumors, the disability is due to the primary condition and not to the position of the uterus. (3) Retroversion after child-bearing with subjective symptoms of prolapse is correctly treated by replacement of the uterus and a pessary, provided the relief of fatigue is also secured and at-tention paid to the general health, mental and physical, and to the improvement of the abdominal and pelvic muscles. (4) If recovery does not follow after six to twelve months, operative measures will give better results than continued pessary treatment, and probably perineal repair and plastic vaginal operations will be more satisfactory than those of the hysteropexy type.   F. L. Adair.

Brash: The Relation of the Ureters to the Vagina. British Medical Journal, October 28, 1922, 790.

The author presents a description and diagrammatic drawings of the relation-ship between the ureters and the vagina. He summarizes the findings as follows: (1) The relation of the lowest portion of the ureter to the vagina is variable, usually lying in front in the connective tissue between the vagina and bladder before entering the bladder wall. (2) This portion of the ureter is equal on both sides if the bladder and the vagina are symmetrically related. Asymmetry is frequent, which causes marked variation in the relationship of the ureter on the two sides. (3) The left ureter has the greater relation to the vagina, occasionally crossing the midline. (4) The left ureter is in a position of greater danger. The reverse is occasionally true. (5) The asymmetrical position of the uterus in the pelvis is explained by the asymmetrical position of the bladder and uterus while they are still abdominal organs and by the greater relative descent and reassumption of the median position in the true pelvis, by the bladder thus rotating the uterus on its axis.   F. L. Adair.

Körner: The Operative Treatment of Retroflexio Uteri by Ligament-ventro-fixa-tion. Zeitschrift für Geburtshilfe und Gynäkologie, 1922, lxxv, 164.

The author reviews the results in 140 cases of retroposition treated by a modified Gilliam operation. In 105 women, this operation was performed alone, in 35 it was combined with colporraphy for prolapsus uteri. Only cases with definite symptoms due to the displacement were operated. Seventy cases were re-examined, 55 with ligament ventrofixation alone, 15 where this operation was combined with colporrhaphy.

Of the 55 cases, the uterus was normally anteflexed in 52 cases, in two cases in midposition, and in one case the retroposition had recurred. In this case a severe wound infection had necessitated removal of the fixation sutures. In 34 cases the subjective results were excellent, in 18 cases good, while in 3 instances, the patients were not relieved. These three cases include one with acute anteflexion, another who had had dense adhesions to her left adnexa, and a third very neurotic patient in whom the objective result was excellent. Of the 15 cases in which the operation was combined with colporrhaphy, the uterus was anteflexed 14 times, in midposition once. In this case, the subjective result was nevertheless good.

Of the 70 patients, 17 had become pregnant after the operation, 14 once, 2 each twice and one four times. Of the 22 pregnancies labor ended at term 13 times,

once with twins. There were no cases of unusual discomfort during pregnancy. Nine cases were delivered spontaneously. One case each required operative delivery because of breech, transverse and face presentation, and one case required forceps delivery because of rigidity of the soft parts. Five cases aborted, one was delivered prematurely at the eighth month, while three were still pregnant at the time of the report. In ten cases operated for sterility, conception took place within six months of the operation, though in four cases the sterility had lasted from 4 to 15 years.   MARGARET SCHULZE.

Nyulasy, Arthur J: **Restoration of the Round Ligaments.** British Medical Journal, December 9, 1922, 1118.

The author traces the history of development of operations for support of the retroverted uterus from the time of Lawson Tait, and briefly mentions some of the various operations for the restoration of the normal position of the uterus. His own operation consists in splitting the anterior leaf of the broad ligament parallel to the round ligament, between the round ligament and the bladder, undermining the opening, and closing it by a purse-string, the outer limit of the purse-string being in the vicinity of the internal abdominal ring and the inner limit being towards the uterine horn. The immediate effect is to bring the uterus into anteversion, and to demonstrate the round ligaments contracted down to their normal length—an interesting physiologic experiment performed directly under the eye. Furthermore, the undue laxity of the anterior leaf of the broad ligament is seen to be reduced. In over 200 cases this operation has caused no complication during subsequent pregnancies and parturitions, and it has been accompanied by uniformly good results.   F. L. ADAIR.

Nutting: **The One-sided Alexander Operation and Its End Results.** Zeitschrift für Geburtshilfe und Gynäkologie, 1920, lxxxiii, 151.

In view of the almost complete disuse into which the Alexander operation has fallen in America, this discussion of the merits of the unilateral operation is rather interesting. The author considers end-results in a series of cases in which only one ligament was shortened, e.g., because of inability to find the other, or poor condition of the patient, etc. He reports 12 per cent recurrences in 26 cases followed for sufficient length of time. The operation is not applicable to cases with large, heavy uterus, or where the ligaments are markedly thinned, as well as in women subject to hard physical labor or with a tendency to abortion. It may be used with good results in other cases of movable retroposition whenever a prolonged operation is contraindicated.   MARGARET SCHULZE.

Bagley: **A Modification of the Baldy-Webster Operation.** Journal American Medical Association. 1921, lxxvi, 791.

Instead of sewing the round ligaments to the posterior wall of the uterus, Bagley proceeds as follows: A vertical incision from 1 to 1½ in. is made on the posterior wall of the uterus, midway between two lateral incisions, ½ in. long, placed just below the uterine cornua and as far outward as possible without injuring the vessels. Forceps burrow under the peritoneum from the central to the lateral incisions, grasp the loops of round ligament which have been brought through an opening in the broad ligament, and draw it through the canal. The two loops are sewn together and the junction covered by re-uniting the central incision. Bagley claims this makes a firmer support, besides preventing adhesions, as the sutures are covered by peritoneum.   R. E. WOBUS.

Richardson: Intestinal Obstruction Following the Webster-Baldy Operation. Surgery, Gynecology and Obstetrics, 1920, xxxi, 90.

In the case reported, the retroversion had recurred. There were no adhesions. On the right side a loop of small intestine three or four inches in length had prolapsed through an opening in the broad ligament through which the round ligament had been passed and external to the latter. The gut was freed by removing tube and ovary. Ventral fixation was then performed.

R. E. WOBUS.

Meyer-Ruegg: The Origin of Genital Prolapse. Schweizerische Medizinische Wochenschrift, 1922, lii, 189.

The writer describes in great detail the fascial planes of the pelvis. The fact is emphasized that these fascials are not well developed until puberty. They not only act in conjunction with the pelvic muscle groups but in reality play a more prominent part in the support of the pelvic organs. After birth there has been a definite stretching and loss of elasticity and the fascial planes have been torn as well. The factor most prominent as direct cause of prolapse then becomes intraabdominal pressure. The constant pressure from above on the inefficient fascial supports primarily and muscle groups secondarily allows prolapse to occur. He relegates to the background rather in summary fashion the work of the levator ani as the usually accepted pelvic diaphragm.

A. C. WILLIAMSON.

Cutler and Jameson: Relaxed Pelvic Floor: End Result in Sixty Cases. Archives of Surgery, 1922, iv, 175.

This paper shows most clearly how important it is to subject our end-results to a most critical survey if we want to know just what we have accomplished. These authors draw a sharp line between those cases in which there was merely a descensus of the vaginal walls and those cases in which there was even a partial descensus of the uterus. In the former group, the results were uniformly good, in the latter even with a moderate sinking of the uterus, the results were not so uniformly satisfactory, while in procidentia the failures amounted to almost 50 per cent. In cases of vaginal and uterine prolapse, short of complete procidentia, the percentage of failures was 60.

Various forms of operations were employed, including abdominal and vaginal hysterectomy. The authors do not, however, mention the interposition operation. They hold that a simple vaginal prolapse can always be cured by vaginal repair but if the uterus is even partially prolapsed, a combined abdominal and vaginal operation becomes necessary. In complete procidentia they urge hysterectomy. In both these types of cases they use the Moscheowitz procedure of obliterating the posterior culdesac. In those cases where suspension is done, the type of suspension depends upon the question of whether or not the patient is likely to bear children.

R. E. WOBUS.

Earl: Cystocele and Prolapse. Minnesota Medicine, 1921, iv, 696.

Treatment must vary in accord with the needs of the individual case. If the cervix is long it must be amputated. The bladder is then elevated on the uterus and the tissues at the base of the broad ligaments sutured together in front of the cervix, throwing it back. It is necessary in nearly every case to restore the lower diaphragm by a perineorrhaphy. Occasionally the ligaments are restored by the Gilliam, or Alexander operation, or by utero-sacral shortening. The author

performs the above procedures during the child bearing period. Vaginal hysterectomy or interposition are the operations of choice after the menopause. The interposition gives the best results in a uterus of normal size. Cystocele without prolapse is treated by mobilization of the bladder and elevation on the anterior surface of the uterus, or by the Rawl's operation. Ventrofixation is reserved for the cases in which it is impossible to construct a strong perineum in support of the plastic work above.   H. W. SHUTTER.

Thorning: **Uterine Prolapse.**   Journal American Medical Association, 1921, lxxvii, 101.

Thorning proposes a new method for fixing the uterus to the anterior abdominal wall for the cure of certain cases which, for some reason, are not amenable to the ordinary operative procedures.

He makes a Pfannenstiel incision with a small vertical cut in the peritoneum. Through this he delivers the uterus. The peritoneum is sewed to the round ligaments and also around the fundus in such a way that the latter is extraperitoneal. A slit is then made through the fundus and a portion of the rectus sheath passed through this slit and sewed in place. The remainder of the fascia is then sewed around the fundus and the skin incision closed.   R. E. WOBUS.

Ferguson: **Inversion of the Uterus, with a Report of Four Cases.**   Edinburgh Medical Journal, 1922, xxviii, 3.

The author reports four cases of uterine inversion, two following labor and two complicating tumors. One of the puerperal cases developed shortly after labor and was discovered at the end of a week, the other occurred in the sixth week after labor. Replacement by taxis was unsuccessful in both cases. Haultain's abdominal operation was successful in one, the other received a vaginal hysterectomy. Hysterectomy gave good results in the two cases where inversion complicated tumors. One of the latter is the third case of uterine carcinoma and inversion in literature. Thorne has reported 83 cases of inversion complicating uterine tumors, mostly of the fibroid type.

Acute inversion carries a mortality of 30 per cent. As shock is the main cause of death in these cases and replacement in itself is accompanied by shock the author feels that the expectant treatment should be employed. The arrest of hemorrhage by vaginal pack and replacement of the fundus later is recommended. Though they may be tried, taxis and reposition are of little use if the inversion has existed for some time. When surgery is necessary the vaginal methods of replacement with less shock and more protection from sepsis are preferable, especially should hysterectomy prove necessary. If the case is clean and the probabilities of success are good, the abdominal route is chosen.   H. W. SHUTTER.

DAVIS & GECK, INC.

KALMERID

Surgical Sutures Exclusively

211-221 Duffield Street ⌣ Brooklyn, N. Y., U. S. A.
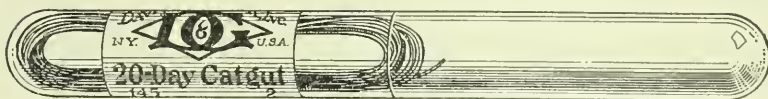
Claustro-Thermal Catgut
Aseptic

Kalmerid Catgut
Antiseptic

CLAUSTRO-THERMAL, the improved method of heat sterilization, consists in applying the heat after closure of the tubes, thus avoiding all the chances of accidental contamination.[1] Sterilization by this positive method is made feasible by use of toluol as the tubing fluid, instead of the unstable chloroform.[2]

No other mode of sterilization so completely fulfills the exacting requirements for the production of ideal sutures as does the Claustro-Thermal method. It preserves the natural physical characteristics of the strands, while the destruction of all bacterial life is absolutely assured.[11]

Claustro-Thermal catgut is aseptic though not germicidal. Not being impregnated with any bactericidal substance, it is inert in the tissues, exerting no inhibitive action.

These sutures are boilable. The tubes even may be autoclaved up to 30 pounds pressure for sterilizing their exterior preliminary to use. The heat sterilization procedure is described on the following page.

KALMERID CATGUT is an improved germicidal suture superseding iodized catgut.[3] It is not only sterile, but, being impregnated with potassium-mercuric-iodide—a double iodine compound—the sutures exert a local bactericidal action in the tissues.[4] It differs from the Claustro-Thermal catgut only in this respect.[11]

The serious disadvantages of iodized catgut—deterioration, irritation, and impaired tensile strength—have been overcome through the use of potassium-mercuric-iodide instead of iodine. Unlike iodine, it does not break down under the influence of light or heat, it is chemically stable, and it is neither toxic nor irritating to the tissues. It interferes in no way with the absorption of the sutures, and is not precipitated by the proteins of the body fluids.[5,6,7]

These sutures are boilable. The tubes even may be autoclaved up to 30 pounds pressure for sterilizing their exterior preliminary to use. The heat sterilization procedure is described on the following page.

VARIETIES OF CLAUSTRO-THERMAL CATGUT
Each Tube Contains Approximately Sixty Inches

Plain Catgut.............................No. 105
10-Day Chromic Catgut....................No. 125
20-Day Chromic Catgut....................No. 145
40-Day Chromic Catgut....................No. 185

SIZES: 000...00...0...1...2...3...4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

A wholesale discount of 25% is allowed on one gross or more ($27 net per gross); carriage paid

VARIETIES OF KALMERID CATGUT
Each Tube Contains Approximately Sixty Inches

Plain Catgut.........Boilable Grade......No. 1205
10-Day Chromic......Boilable Grade......No. 1225
20-Day Chromic......Boilable Grade......No. 1245
40-Day Chromic......Boilable Grade......No. 1285

SIZES: 000...00...0...1...2...3...4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

A wholesale discount of 25% is allowed on one gross or more ($27 net per gross); carriage paid

Kalmerid catgut is made also in an extra flexible grade, which is non-boilable, and which is described on the following page.

GERMICIDAL EFFICIENCY
AS COMPARED WITH IODIZED CATGUT

The marked inhibitory power of Kalmerid catgut, as compared with iodized sutures, is strikingly shown in these reproductions of culture plates. The lighter areas about the imbedded sutures represent zones of no bacterial growth, while the darker portions are masses of Staphylococcus colonies. It is evident that Kalmerid sutures exert in the tissues a far greater antiseptic action than do the usual iodized sutures.[4,7,11]

Kalmerid catgut imbedded in agar infected with Staphylococcus pyogenes aureus

Iodized catgut imbedded in the same medium. Note the proximity of colonies

See Advertisement on Inside of Front Cover

BOTH Claustro-Thermal and the boilable grade of Kalmerid catgut, described on preceding page, are subjected to the same sterilizing procedure: the sealed tubes are submerged in a bath of cumol and there exposed for five hours to the rigorous temperature of 165° C. (329° F.).[1] It is obvious that sterility is absolutely assured. Rigid bacteriologic control is maintained.

Hours	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
C. 165°C					5 Hours at 165°C.														F. 329°F
155°C																				311°F
145°C																				293°F
135°C																				275°F
125°C																				257°F
115°C																				239°F
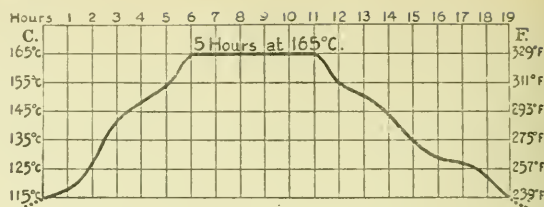
Kalmerid Catgut— (Non-Boilable Grade)
Extra Flexible

THE NON-BOILABLE grade of Kalmerid catgut differs from the boilable variety described on the preceding page in that it possesses extreme flexibility—a characteristic sometimes desired by surgeons accustomed to the use of iodized catgut.[7] It is impregnated with potassium-mercuric-iodide, causing the sutures to exert a local bactericidal action in the tissues.[11]

Potassium-mercuric-iodide is the double salt of iodine and mercury,[6] the chemical formula of which is $HgI_2.2KI$. Through its use the serious disadvantages of iodized catgut—deterioration, irritation, and impaired tensile strength—have been overcome.[3] It is one of the most active germicides known, exerting a killing action on bacteria about ten times greater than that of iodine.[4,5] Physiologically it is bland and is entirely compatible with the tissues, not being precipitated by the proteins of the body fluids.

VARIETIES OF THE NON-BOILABLE GRADE OF KALMERID CATGUT
Each Tube Contains Approximately Sixty Inches

Plain Catgut.......Non-Boilable Grade....No. 1405
10-Day Chromic....Non-Boilable Grade....No. 1425
20-Day Chromic ...Non-Boilable Grade....No. 1445
40-Day Chromic....Non-Boilable Grade....No. 1485

SIZES: 000...00...0...1...2...3...4
In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

A wholesale discount of 25% is allowed on one gross or more ($27 net per gross); carriage paid

Kalmerid Kangaroo Tendons
Boilable ◦ Non-Boilable

KALMERID KANGAROO TENDONS are the sutures par excellence for those procedures in which post-operative tension is extreme, or long continued apposition necessary, such as in herniotomy, and in tendon or bone suturing. They are not only sterile, but, in addition, are impregnated with potassium-mercuric-iodide, as in Kalmerid catgut, which enables them to exert a local bactericidal action in the tissues.[3,4,11]

They are genuine kangaroo tendons; they are smooth, straight, of uniform contour, and possess a tensile strength about twice that of catgut.

The tendons are chromicized, and so accurately is the process regulated that each size will maintain apposition in fascia or in tendon for approximately thirty days.[8]

Kalmerid kangaroo tendons are prepared in two grades—boilable and non-boilable. The latter are extremely pliable.[7]

VARIETIES AND SIZES

Non-Boilable are Product No. 370
The Boilable are Product No. 380

Each Tube Contains One Tendon
Lengths Vary From 12 to 20 Inches

SIZES: 0...2...4...6...8...16...24

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

A wholesale discount of 25% is allowed on one gross or more ($27 net per gross); carriage paid

THE PERMEATION OF KALMERID SUTURES BY POTASSIUM-MERCURIC-IODIDE

The lighter shaded specimen is a cross section of a strand of plain Kalmerid catgut, highly magnified.

The darker shaded specimen is a cross section of the same strand reacted upon by ammonium sulphid to precipitate the mercuric element.

The uniform color throughout the darker section shows the thorough permeation by the potassium-mercuric-iodide, the equable distribution of which assures a supply of this germicidal substance in the tissues until the suture is entirely absorbed.

General Qualities of All D & G Sutures

THE SALIENT FEATURES of all varieties of D&G Sutures are compatibility with the tissues, perfect absorbability, maximum tensile strength, accuracy of sizes, flexibility, and absolute sterility. They are unaffected by age or light, or by extremes of climatic temperatures.

Various Non-Absorbable Sutures
Heat Sterilized After Closure of Tubes—Boilable

Product No.		Approximate Quantity in Each Tube	Standard Sizes
350..	Celluloid-Linen Thread..	60 Inches....	000, 00, 0
360..	Horsehair...........	4 28-In. Sutures.......	00
390..	Plain Silkworm Gut.	4 14-In. Sutures...	00, 0, 1
400..	Black Silkworm Gut.	4 14-In. Sutures...	00, 0, 1
450..	White Twisted Silk....	60 In...	000, 00, 0, 1, 2, 3
460..	Black Twisted Silk....	60 In.........	000, 0, 2
480..	White Braided Silk....	60 In.........	00, 0, 2, 4
490..	Black Braided Silk....	60 In..........	00, 1, 4

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

Wholesale discount of 25% allowed on gross or more; carriage paid

Sutures For Minor Surgery
Heat Sterilized After Closure of Tubes—Boilable

Product No.		Approximate Quantity in Each Tube	Standard Sizes
802..	Plain Catgut.....	20 In.....	00, 0, 1, 2, 3
812..	10-Day Chromic Catgut..	20 In.....	00, 0, 1, 2, 3
822..	20-Day Chromic Catgut..	20 In.....	00, 0, 1, 2, 3
862..	Horsehair.........	2 28-In. Sutures........	00
872..	Plain Silkworm Gut.	2 14-In. Sutures.........	0
882..	White Twisted Silk......	20 In........	000, 0, 2

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)........$1.50

Wholesale discount of 25% allowed on gross or more; carriage paid

Sutures With Needles
Heat Sterilized After Closure of Tubes—Boilable

Product No.		Approximate Quantity in Each Tube	Standard Sizes
904..	Plain Catgut............	20 In.....	00, 0, 1, 2, 3
914..	10-Day Chromic Catgut..	20 In.....	00, 0, 1, 2, 3
924..	20-Day Chromic Catgut..	20 In.....	00, 0, 1, 2, 3
964..	Horsehair.........	2 28-In. Sutures........	00
974..	Plain Silkworm Gut.	2 14-In. Sutures.........	0
984..	White Twisted Silk......	20 In........	000, 0, 2

EMERGENCY NEEDLE
For Skin, Muscle, or Tendon

In packages of twelve tubes of one kind and size

List Price per dozen tubes (in U. S. A.)..........$3

Wholesale discount of 25% allowed on gross or more; carriage paid

Obstetrical Sutures
For Immediate Repair of Perineal Lacerations
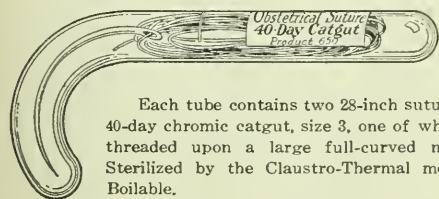
Each tube contains two 28-inch sutures of 40-day chromic catgut, size 3, one of which is threaded upon a large full-curved needle. Sterilized by the Claustro-Thermal method. Boilable.

One tube in a package

Product No. 650. List Price per tube..........$ .35

Wholesale discount of 25% allowed on gross or more; carriage paid

Circumcision Sutures
Heat Sterilized After Closure of Tubes—Boilable

Each tube contains a 30-inch suture of plain catgut, size 00, threaded upon a small full-curved needle.

In packages of twelve tubes

Product No. 600. List Price per dozen tubes......$3

Wholesale discount of 25% allowed on gross or more; carriage paid

Umbilical Tape
Heat Sterilized After Closure of Tubes—Boilable

Each tube contains two 12-inch ligatures of a specially woven flat tape one-eighth inch wide

In packages of twelve tubes

Product No. 892. List Price per dozen tubes....$1.50

Wholesale discount of 25% allowed on gross or more; carriage paid

Standard Sizes For All Sutures

000	IN conformity with the long recognized need for a unified system of sizes, the standard scale of catgut sizes now embraces all sutures, including silk, horsehair, silkworm gut, celluloid-linen thread, and kangaroo tendons (only the latter occurring in sizes 6, 8, 16, and 24).
00	
0	
1	
2	
3	
4	
6	
8	
16	
24	

Bibliography

1 AN IMPROVED METHOD FOR STERILIZING CATGUT SUTURES. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Sept. 1919.

2 TOLUOL: ITS ADVANTAGES OVER CHLOROFORM OR ALCOHOL AS A STORING FLUID FOR SURGICAL CATGUT. By Allen Rogers, Ph. D. Annals of Surgery, March 1916.

3 AN IMPROVED SUBSTITUTE FOR IODIZED CATGUT SUTURES. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Jan. 1916.

4 AN IMPROVED SUBSTITUTE FOR IODIZED CATGUT SUTURES —II. BACTERIOLOGICAL TESTS. By Cassius H. Watson, B.S., M.D. Surg., Gyn. & Obstet., Nov. 1916.

5 THE GERMICIDAL VALUE OF POTASSIUM MERCURIC IODIDE. By Douglas Macfarlan, M. D. Amer. Jour. Med. Sci., April 1920.

6 POTASSIUM-MERCURIC-IODIDE—ITS NATURE, ACTION, AND USES. Davis & Geck, Inc., 1920.

7 KALMERID—AN IMPROVED CATGUT TO SUPERSEDE IODIZED SUTURES. Davis & Geck, Inc., 1916.

8 THE ABSORPTION AND TENSILE STRENGTH OF CERTAIN ABSORBABLE ANIMAL LIGATURES. By Gray Phillips, M.D. Jour. A. M. A., April 25, 1914.

9 CHROMICIZED CATGUT PREPARED TO RESIST ABSORPTION FOR DEFINITE PERIODS. Davis & Geck, Inc., 1916.

10 ABSORBABLE ANIMAL LIGATURES. By Thomas A. Berryhill, M. D., Medical Director, United States Navy. U. S. Naval Medical Bulletin, July 1913.

11 D&G SUTURES—A COMPLETE DESCRIPTION OF METHODS. 48 pages. Davis & Geck, Inc., 1923.

Reprints will be sent upon request

VALUABLE ASSETS OF SURGERY
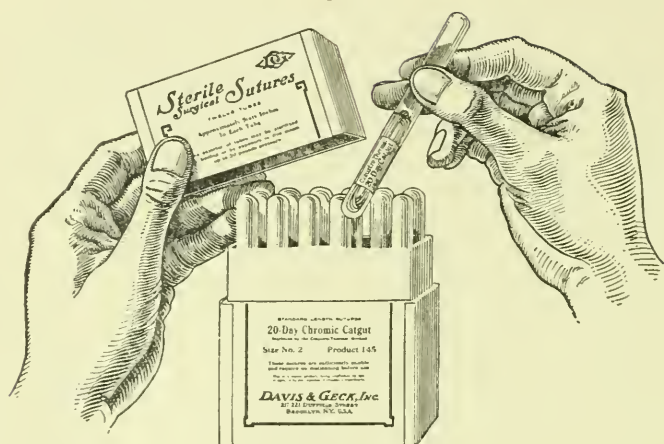
STANDARD PACKAGE
Containing Twelve Tubes of One Kind and Size

Discount

THE standard wholesale discount of 25% from list prices is accorded hospitals and surgeons on any quantity of sutures, of a kind or assorted, down to one gross. Under a gross the list prices are net.

D&G sutures are sold by practically all of the responsible dealers in surgical supplies, or may be obtained, carriage paid, direct from Davis & Geck, Inc.

Back Numbers Wanted

We will pay 75c for copies of the March, April, June, July, 1921, and January, 1922, issues of *American Journal of Obstetrics and Gynecology.* When sending your journals write us.

Journal of Obstetrics and Gynecology

508 N. Grand Bvld.   ST. LOUIS, MO.
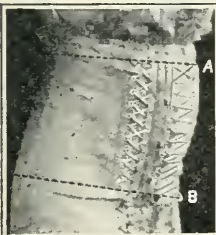
The Non-Ptosis Service

Supportive Bandaging— Expert Corseting:

Scientific Diagramming. Measurements — Adjustment — Fittings Conform to Individual requirements. Beneficial results are immediately observed under X-Ray Ease, comfort, increasing good health with grace in appearance assured.

Mrs. C. Dahlbye-Petersen
Formerly Assist. Sup't and Instructor. Royal Maternity Hospital (King Frederiks) Copenhagen.

1041 Marshall Field Annex   615 Davis Street
. Chicago   Evanston
Phone Central 5184   Phone Evanston 1878

CONTENTS FOR JUNE, 1923

Original Communications

CONTENTS—*Continued*

CONTENTS—Continued

(Continued from page 6.)

The American Journal of
Obstetrics and Gynecology

Original Communications

FOLLICULOID CANCER OF THE OVARY*

A RARE PATHOLOGICAL ENTITY, AND A CONSIDERATION OF
OVARIAN NEOPLASMS IN THE LIGHT OF HISTO-
GENETIC AND MORPHOLOGIC CORRELATIONS

BY M. R. ROBINSON, M.D., F.A.C.S., NEW YORK CITY

*Attending Gynecologist Beth Moses Hospital, Adjunct Gynecologist Beth Israel
Hospital*

PART I

FOLLICULOID cancer of the ovary is one of the rarest entities in
gynecological pathology. The standard American text books
on general and special pathology contain no record of this type
of ovarian tumor. Only recently has this subject received con-
sideration by R. T. Frank[1] and James Ewing.[2] The former gave
this subject only a passing mention, and while the latter has dwelt
upon it at a much greater length, he has only given us informa-
tion based upon long abandoned theories. Original contributions
to this subject have been made by Ziegler,[3] Stratz,[4] Fritsch,[5] C. V.
Kahlden,[6] and Pfannenstiel.[7] These observers have coined the terms
folliculoma, cylindroma ovarii, and carcinoma folliculare, for this
type of ovarian cancer.

Fritsch and v. Kahlden while acquiescing to the above nomenclature
were among the very first to discard the Pflüger tubules, as well as

the granulosa epithelium as the probable genetic sources for this form of cancer; their objections are based upon the following facts. Fritsch says: "The graafian follicle epithelium is a finished product, incapable of proliferation, and can only act in a passive manner and form cystic degeneration of the follicle." v. Kahlden claims, "that it is not a case of direct development of this type of ovarian cancer from the epithelium of the graafian follicles, but a condition of an excessive growth of small round structures, which by virtue of their epithelial rim, the enclosure of a protoplasmic mass containing some nuclei, and the presence of a membrana propria, resemble most closely the primordial follicles, which although they contain no ova, are allied to them by their differentiation from the surrounding epithelium, which is being retained for a long time. We may therefore term this form of ovarian cancer an adenoma of the graafian follicles which has little tendency to cyst formation."

The facts that may be gathered from the above hypotheses are: (a) that the granulosa of the follicles is not the epithelium from which these tumors arise, and (b) that this epithelium has no power of independent growth; the rest of the argument is contradictory, for how could a structure devoid of independent proliferative properties undergo adenomatous formation? What the individual granulosa cell cannot do, the aggregate of cells will also fail to accomplish.

v. Werth[8] was the first one to appreciate the incongruity that exists between the inception of this tumor and the prevailing conception of its further development. In order to harmonize this pathological dissonance he placed this type of ovarian cancer into a separate category.

Robert Meyer[9] in 1916 and again in 1918[10] shed new light upon this subject and his theories are thus far the most sound. He says, "The ripe follicle epithelium can hardly be considered as a tumor forming tissue, for at no time have proliferative phases been observed in it, and that it stands or falls with the maturation of the ovule. There is no other cell type whose existence is so slavishly dependent, it is therefore plausible to ascribe to the clumps of primordial granulosa which were retained in the ovarian stroma, the genetic source of folliculoid and of cylindroid ovarian cancer."

We shall now proceed with our study and compare the pathological findings with the views of the last quoted authority.

CASE REPORT

Mrs. K., married, age 59, had three children and one abortion. Her menses began at fourteen, three to four weekly in type, duration 2 to 3 days. The last period took place in the beginning of November, 1913. For seven years she suffered from irregular uterine bleeding. On December 1, 1920, a supravaginal panhysterectomy was performed for multiple fibroids of the uterus.
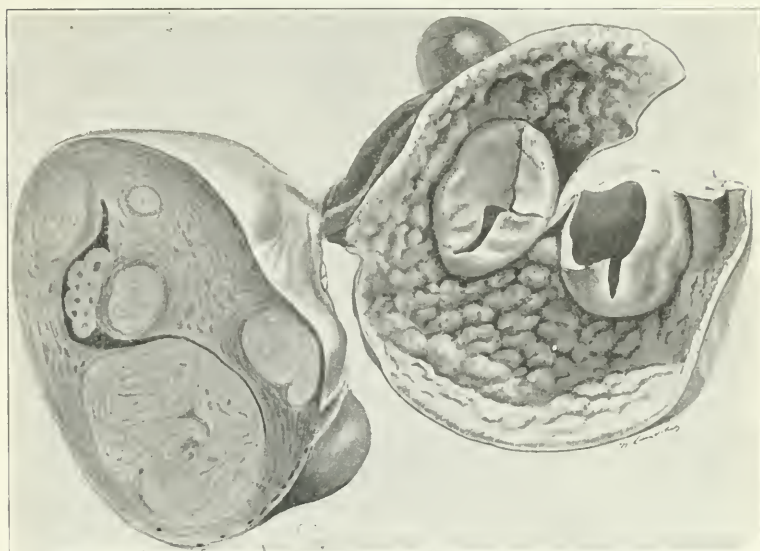
Fig. 1.—Uterus with multiple fibroids and the left ovarian tumor.

Fig. 2.—Cyst wall of daughter cyst, showing an invasion of round cell epithelium. The outer group at *A* is arranged into cylinders, the inner one at *B* into a more homogeneous formation.

Macroscopical Findings.—(Fig. 1.)   The uterus, irregular in outline, is twice the size of a fetal head and contains several subserous and interstitial fibroids, also a submucous polyp.   The right ovary is gyrate in type and its corresponding tube, with the exception of bearing an accessory tubule, is normal in appearance. The left tube is also normal, but the left ovary is the seat of a cystic tumor, heart shaped in form, as large as a double fist, with a smooth outer wall.   On cross section the inner surface of the cyst wall presents an irregular wavy outline, covered with a grayish yellow membrane 1 cm. thick and two daughter cysts, each of which equal in size a pigeon's egg, with thin, smooth, inner and outer walls.
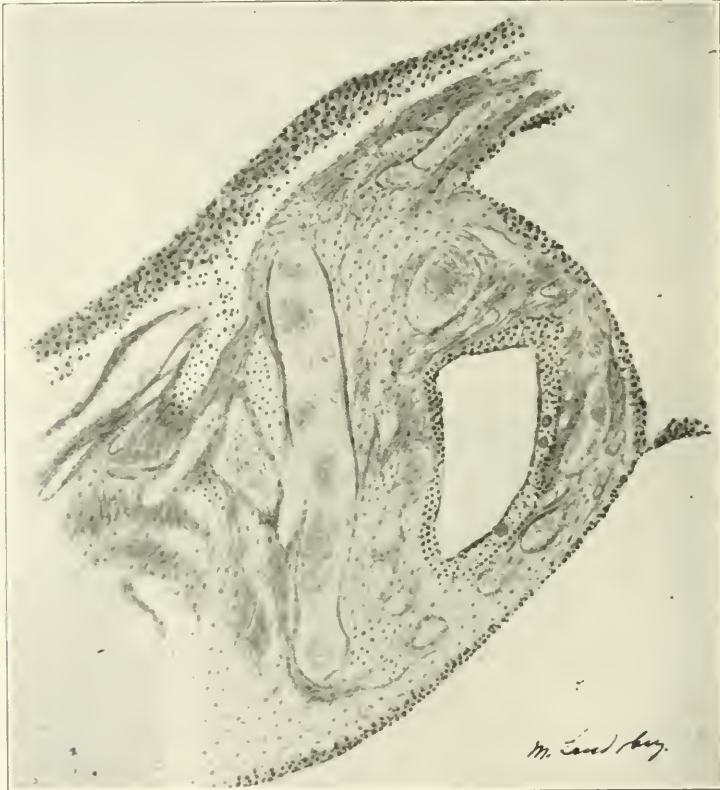
Fig. 3.—An irregular folliculoid space, surrounded by several rows of light staining epithelium, simulating a theca externa.

Microscopic Findings.—The polyp, the fibromyomata, and both fallopian tubes showed nothing of pathologic significance.

The wall of the daughter cysts (Fig. 2) consists of a connective tissue structure, part of which is embryonal in character and contains an excess of capillaries. Its continuity is broken by an invasion of round cell epithelium which is separated into two uneven bands.   The one lying closer to the outer surface of the wall is arranged into strands and cylinders (Fig. 2, A) while the epithelium of the narrow inner band presents an homogeneous formation (Fig. 2, B).   These epithelial cells closely resemble the granulosa of the graafian follicles.   Within the inner narrower zone of epithelium, a number of small, uniform ovoid, pinkish aggregates, of a homogeneous substance are noted, located almost equidistantly.   The epithelial cells

Fig. 4.—The epithelial masses are separated into lobules by broad connective tissue bands, and contain globules of a homogeneous gelatinous substance.
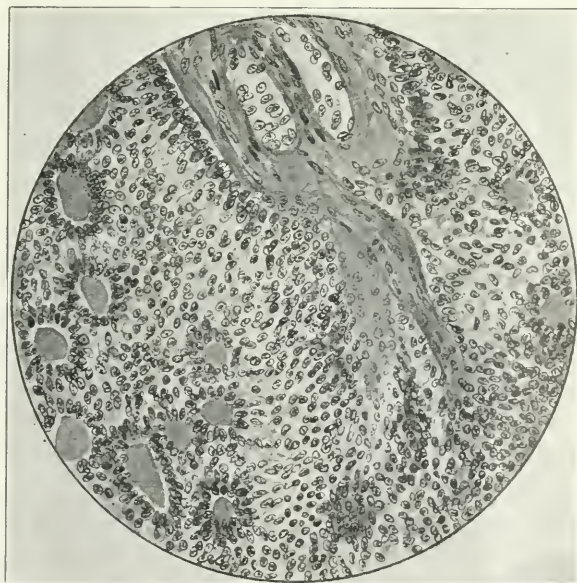
Fig. 5.—High power appearance of the folliculoid bodies.

lying at the outer borders of this epithelial band stain more deeply than the rest thus giving it a distinct outline. In another section we find an irregularly ovoid space (Fig. 3) surrounded by a uniform narrow zone of epithelial cells which take on a much lighter stain and it recalls the appearance of a theca interna, the space itself is empty. Some of these epithelial cells besides bearing a close resemblance to the granulosa cells also simulate the cancer cells observed in tumors of very young individuals.

Fig. 6.—Folliculoid bodies, intrafollicular spaces filled with well organized connective tissue, and surrounded by a lighter staining area simulating a theca externa.
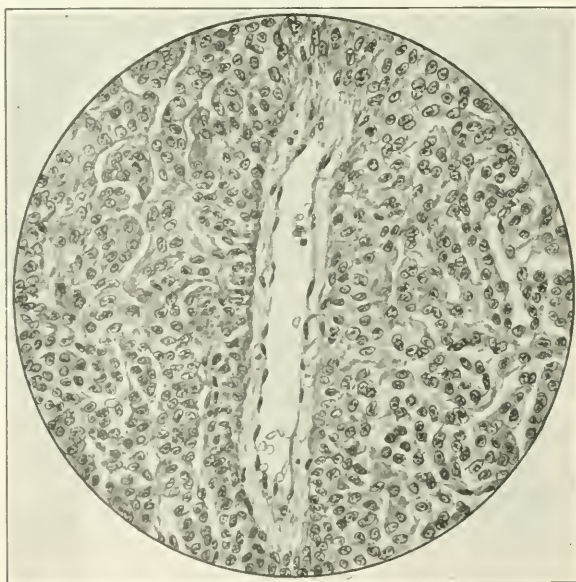
Fig. 7.—Cylindroid type of ovarian cancer in which the cells are arranged into long straight, at times winding, strands.

The wall of the parent cyst offers the following points of interest. The germinal epithelium is well retained in some parts, and the cortical portion of the ovary can be readily recognized. It is devoid of graafian follicles and corpora lutea, but it does contain a few corpora albicantia. It too shows an excess of blood vessels.

Proceeding toward the medullary portion of the ovary no vestige of normal

structure is found, its place is taken by a neoplasm (Fig. 4) the predominant constituent of which is a type of epithelium similar to the one already observed in the walls of the daughter cysts. These cell masses are arranged in this location into lobules, which are separated by broad bands of well organized connective tissue carrying blood vessels and tumor cells; some of these septa show hyaline changes.

Scattered throughout the lobules are round or oval clumps of a translucent, gelatinous, homogeneous substance. The epithelial cells surrounding these masses of exudate or secretion assume a columnar shape with their nuclei resting on an imaginary basement membrane, thus forming bodies within the stroma which bear a close similarity to follicles (Fig. 5). This unique morphological formation has given rise to the theory that this tumor originates from graafian follicles. Some observers have gone still further and have even described the presence of a theca interna. In (Fig. 6) this phenomenon is well presented, the arrow points to a

Fig. 8.—Cylindroid type in which the epithelial strands twist and wind into convolutions simulating the bizarre figures of mohair silk.

follicle which is encircled with a dark staining epithelial border outside of which is a fairly wide area of lighter colored cells. Not only does this round epithelium change into columnar in the immediate vicinity of the folliculoid bodies, but also when it is in close proximity to the connective tissue septae.

We shall now consider in detail the different structural elements entering into the formation of this tumor.

The epithelial cells are preponderantly round in form, at times short and oval but only exceptionally are they irregular in outline. Mitosis is not seen, and the restlessness of the cells, so characteristic a feature of cancer in general, is here conspicuously lacking. The cell stroma stains poorly, it is pale pink in color and contains a fine thread-like protoplasm. The nuclei are big, full and round and almost fill the cell body. They occupy a central position most of the time. The nucleoplasm is granular, some of these granules take on a deeper stain than the rest and stand out in marked contrast to the others.

The intrafollicular contents vary with the size of the follicles. In the small and the medium sized ones it retains a gelatinous character, while in the large ones this semisolid substance is replaced by connective tissue, which stains pinkish red with eosine and brown yellow with Van Giesen.

Besides the folliculoid type we also find tumors in which the cylindroid grouping prevails (Fig. 7) or in which the epithelial strands twist and wind themselves into convolutions simulating the bizarre figures of mohair silk (Fig. 8). Then there are tumors in which both types the cylindroid and the folliculoid hold equal sway.

Clinically these tumors furnish the following data: They are unilateral in character and vary in size from that of a normal ovary to that of an adult's head. The size of the tumor does not materially alter its morphology, excepting that the large tumors are as a rule cylindroid, while the smaller ones are folliculoid in form. The follicular type may be recognized macroscopically by the elevations on its cut surface and by its tendency to cyst formations, which vary in size from a pea to a hen's egg. The cylindroid type on the other hand retains a solid consistency; hemorrhages and necroses may take place in either variety.

How are we to correlate the morphologic phenomena observed in these tumors with their histogenesis? Which is fact and which is fancy? Do the structural arrangements warrant the conclusion that these tumors are derived from the epithelium of the graafian follicles? Are these three types the cylindroid, the folliculoid and the mixed forms different tumors with an independent genetic origin, or do they represent different stages in the metaplastic evolution of one and the same tumor? Which of these types is the forerunner? Taking up these questions categorically and serially, the one of histogenesis demands our first attention.

It is an accepted axiom that in its undifferentiated state the ovarian parenchyma consists of a conglomeration of epithelial cells derived from the germinal epithelium and of ova. These epithelial invasions appear at first in the form of clusters, which later on group themselves into circular bodies enclosing ova. This constitutes the primary follicles lined with a single layer of cuboidal epithelium. As the connective tissue element in the ovarian stroma increases in amount the interfollicular spaces become wider, the follicles mature and occupy exclusively the cortical portion. Some of the epithelial masses remain as rests in the ovarian stroma without entering into the formation of follicles, others become destroyed as soon as they reach the medullary portion, still others form the rete ovarii, and some are supposed to form the Pflüger tubules.

From which of these epithelial *anlagen* in the ovary do the cylindroid and the folliculoid types of ovarian cancer spring? They cannot arise from the epithelium of the Pflüger tubules since this structure

does not exist in the human ovary; nor can the ripe granulosa form the source of these tumors, as it does not enjoy an independent proliferative potency. The only instance when we may note an hyperplasia of the granulosa is when it is under the hormonic influence of the ovum; but neither in my case nor in the case of Robert Meyer have any graafian follicles or corpora lutea been found. We must hence arrive at the conclusion that the only possible epithelial *anlage* form which the folliculoid and the cylindroid cancer may evolve, is from the unused rests of primordial granulosa conglobulates. As to the question of a "theca interna" described by some observers, a critical examination of the lighter staining areas surrounding some of the folliculoid bodies reveals that it is due to an antipodal position of the nuclei; those of the innermost row resting against the follicle capsule, while those of the outer row against the tumor parenchyma, thereby giving rise to this morphological illusion. The epithelioid character of the cells in this light area described by R. Meyer I could not observe in my specimens.

Whether the cylindroid and the folliculoid forms are separate tumors or different evolutionary phases of one and the same tumor, can be positively answered in favor of the latter view. The epithelial cells, which form the main constituent of these varieties of tumor are identically the same, only they assume different groupings from time to time. The cylindroid type undoubtedly represents an earlier phase as it does not show any of the signs of tissue breakdown noted in the folliculoid form. The contents found within the follicles are products of a "nutritive process" i.e., the result of cell necrosis and liquefactions; the replacement of the semisolid or gelatinous intrafollicular contents by connective tissue, as seen in some of the follicles indicates an older morphologic phase. The circular or ovoid arrangements of the epithelial cells around these clumps of exudate, and their change to a columnar type, may be interpreted as an expression of a defensive mechanism to stem the further inroad of the process of disintegrations.

The histologic, embryologic and physiologic data adduced in the elaboration of our theme, justify us to offer the following conclusions relative to the histogenesis and the morphology of cylindroid and folliculoid cancer:

a) Histogenetically, cylindroid and folliculoid cancer and the type including both forms, are all derived from the primordial granulosa nests.

b) These cancer cells show, in marked contrast to the usual forms, uniformity and an approach to maturity.

c) The cylindroid type is most likely the forerunner as evidenced by the absence of degenerative changes.

d) The fact that the epithelial cells composing these tumors bear a very close resemblance to the granulosa cells, and because of their tendency to group themselves in some cases, into follicle like bodies, are not sufficient evidence to warrant the assumption that they are derivatives of graafian follicles.

e) The proper terminology for this form of ovarian cancer is "cylindroid and folliculoid" which describes a structural similarity to graafian follicles, without implying a derivation from them.

PART II

THE HISTOGENETIC AND MORPHOLOGIC CORRELATIONS OF OVARIAN NEOPLASMS

The above conclusions have been reached after long, laborious, and most critical studies by many clinicians and pathologists. Equally difficult if not more, was, and still is, the task of clarifying the nebulous atmosphere which shrouds the classification of ovarian tumors in general. The literature on this subject is voluminous and it keeps on growing from year to year, without materially lessening the confusion. There are two main reasons for this chaotic state in the realm of ovarian pathology.

1. The complex anatomical and physiological properties of the ovary subject it more than any other organ in the body to structural deviations and to functional disturbances.

2. The liberty taken by many contributors, to exercise their speculative originality in this happy pathologic hunting ground, without accountability for histogenetic and morphologic correlations.

A vivid example of this confusion is witnessed daily in many operating rooms, where abdominal surgeons invent different pathologic terms on different occasions for tumors of genetically like *anlagen*.

In the study of tumor pathology we must be cognizant of the fact that the trophoblastic origin of the tumor and not its macroscopic appearance, not even the morphologic arrangement of its proliferating cells, suffices to constitute a complete and comprehensive pathologic diagnosis. To depend upon these factors alone may often be misleading, for the grouping of the multiplying cells and their structural disposition are in a large measure controlled and influenced by extracellular causes such as the character of the invaded tissue whether it is hard or soft; the age of the organism at which the new growth makes its appearance; the reaction of the tumor carrier to the neoplasm; and the time in the life process of the tumor at which we happen to examine it. These histologic and biologic facts in tumor pathology have been exemplified in the preceding study of folliculoid cancer.

With full knowledge of this chaotic state, and conscious of the fact that my attempt to offer, what seems to me, a simplified classification of ovarian tumors may not be proof against criticism, I venture nevertheless after deep reflection, to join the multitude and propose a classification which tends to keep the relationship between histogenesis and morphology closely linked, based upon the research and the clinical investigations of the best authorities.

OVARIAN TUMORS

Out of the monumental works of Pfannenstiel, Robert Meyer, and O. Frankl[11] I have arranged the following classification; it is brief, simple, easily mastered and readily applicable in our daily practice.

1. Retention Cysts.
  - A. Follicle cysts
  - B. Corpus luteum cysts
  - C. Accessory lutein cysts

2. Tumors.
  - (A) Benign
    - (a) Stromatoid
      - 1. Myoma
      - 2. Fibroma
    - (b) Parenchymatoid — Adenocystoma
      - 1. Serosum
      - 2. Pseudomucinosum
  - (B) Malignant
    - (a) Stromatoid — Sarcoma
    - (b) Parenchymatoid
      - 1. Adenocystoma Malignum
      - 2. Primary Carcinoma
      - 3. Metastatic Carcinoma
      - 4. Folliculoid Carcinoma?

3. Ovulogenous.
  - A) Dermoids, are benign and may become malignant
  - B) Teratoids, are malignant and may be benign.

Of all the tumors developing in the ovary the cystic variety is by far the most common, we shall hence devote our attention to this group in particular. It is essential that before proceeding with the further elaboration of the subject, an agreement should be reached as to the usage of the terms "cyst" and "cystoma"; limiting the former term to growths which are the product of a "nutritive change" and the latter for those neoplasms which developed as a result of a "proliferative process."

A. *Follicle Cysts.*—Follicle cysts are in the vast majority of cases the result of an inflammatory process, which causes a degeneration, liquefaction and finally an absorption of the granulosa and of the ovule; followed later on by a transudate into the follicle cavity with the development of a cyst. The cyst contents are fluid, straw colored or greenish in hue, mixed with some debris and serous in nature. Microscopically the cyst wall shows a columnar or a cuboidal epithelial lining, depending upon the degree of intracystic pressure. A corpus luteum is rarely found in ovaries so affected.

Clinically we describe these ovaries as microcystic, they seldom

exceed in size that of an adult's fist, and while their presence rarely causes mechanical disturbances, the functional disorders they produce such as metrorrhagia, are at times so serious in nature, that many uteri have been unnecessarily sacrificed in order to stop these troublesome uterine bleedings.

How do these cystically degenerated ovaries influence the uterine mucosa and bring about this intermittent or continuous uterine bleeding?

It is at present a well-known fact that as long as the corpus luteum is active, a period corresponding approximately to the interval between the 17th and the 28th day of the menstrual cycle, no uterine bleeding
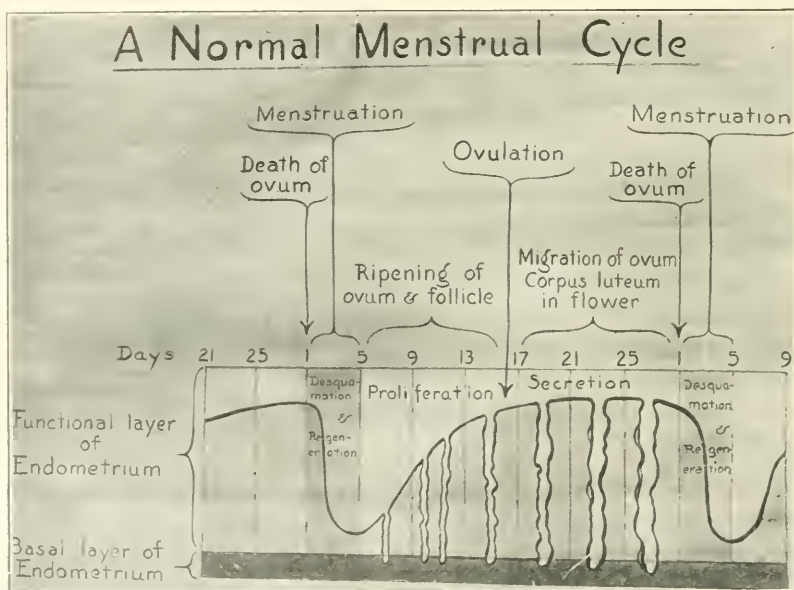
Chart 1.—A descriptive and graphic presentation of a normal menstrual cycle. (After Schröder.)

takes place (Chart 1). During this period the uterine mucosa is in a state of hypertrophy and hyperplasia, it is congested, soft, velvety, awaiting the arrival of the migrating ovum which is groping its way towards the uterine interior. If ovulation has not been followed by impregnation and the ovum died, (Chart No. 2) then the corpus luteum begins to recede, it gradually involutes, finally atrophies and the inhibitory influence which it has exerted up till now upon the next maturing follicle ceases. The tension in the hyperemic uterine mucosa is lowered, rhexis of its superficial blood vessels takes place, the mouths of the uterine glands open and their trypsin containing mucus is poured out, which helps in dissolving the functional layer of the mucosa, and this cast off tissue together with the extravasated blood

is discharged from the uterus and menstruation is thus established. Under normal conditions the menstrual flow stops after three to seven days, the old corpus luteum proceeds on its downward path of atrophy, so that in about eight weeks all that is left of it is the corpus albicans. Simultaneously with the beginning degeneration of the corpus luteum the next ripening graafian follicle gains in ascendency towards maturation, it causes the basal layer of the uterine mucosa to regenerate, the functional layer is being reformed, thus preparing itself for the next pregnancy or menstruation. These in brief are the most important structural and functional phases of a normal menstrual cycle (Chart 1).

But when the ovaries are cystically degenerated, the above described physiological sequence of events does not take place. Each cystic follicle represents the end result of a thwarted cycle. Ovula-
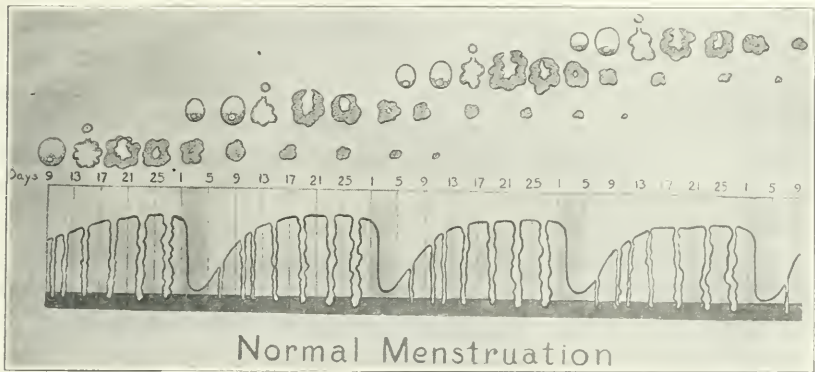
Chart 2.—A graphic presentation of the simultaneous morphologic changes within the graafian follicle and in the uterine mucosa during a menstrual cycle. (After Schröder.)

tion has not been completed. The ovule died before it has had a chance to escape from the follicular cavity, a corpus luteum has not formed; so that each follicle cyst calls forth a stimulating effect upon the uterine mucosa with a resultant congestion. It is true that the influence exerted by the individual follicle cyst is negligible, but the cumulative effect of numberless cysts forms a sufficiently potent factor to heighten the degree of hyperemia and the consequent bleeding, particularly in the absence of the inhibitory influence of the corpus luteum. These are the underlying principles of this type of metrorrhagia, or what we might better term, a continuous menstruation.

Bilateral partial oöphorectomy has in the experience of many gynecologists as well as in my own, rendered the most gratifying results.

B. *Corpus Luteum Cysts.*—Corpus luteum cysts are very rare. O.

Frankl has seen only nine in his extensive experience, up to 1921. The microscopic appearance of the cyst will vary with the period in the life cycle of the follicle at which the degenerative changes have set in. If the cyst is small, remnants of corpus luteum structure may still be evident, but in the larger ones they are hardly traceable. The term "lutein cyst" seems to be more appropriate, since the time at which these results of degeneration reach the pathologist, the corpus luteum as such has long lost its histological characteristics as well as its physiological importance.

Lutein cysts are usually monolocular, their walls may reach the thickness of 4-5 mm., and are composed of two easily distinguishable layers. The outer one is smooth and composed of connective tissue, the inner one is yellowish in color and wavy in outline, and can be peeled off from its outer envelope. The contents consist of a clear yellow or reddish brown liquid. These cysts are frequently the seat of a hematoma or an abscess.

Persistent corpora lutea cysts may be the cause of absolute or relative sterility associated with oligomenorrhea. Their enucleation has in my experience been followed by a restoration of an almost normal menstrual function and in two instances conception with pregnancy to term has resulted.

C. *Accessory Lutein Cysts.*—This type of cyst formation in the ovary is frequently observed during pregnancy, it is also a concomitant of chorioepithelioma, hydatid mole, and carcinoma of the body of the uterus. These ovaries become converted into multilocular cysts with thin walls and may reach the size of an orange. Microscopically a hyperplasia of lutein-like cells are found in some part of the wall on its inner surface. Simultaneously with the intracystic lutein proliferation there also takes place a hyperplasia of lutein cells in the ovarian stroma; these masses of lutein cells have been interpreted erroneously as malignant growths. Aschner,[12] Stieve,[13] and others have ascribed to them incretory properties and have termed these aggregates of lutein cells "the interstitial gland of the ovary." Concerning this structure much has been written, its existence in the human species is denied by very many, and its hormonic value still awaits solution.

From a clinical viewpoint these lutein proliferations may be considered in the following light. Under the hormonic influence of the corpus luteum of pregnancy, or under the still more exaggerated stimulation in the case of hydatid mole or chorioepithelioma, some dormant lutein cells within these cysts or within the interstitial portions of the ovarian stroma, from where their original histological relation to the corpus luteum can no longer be followed, are aroused into excessive proliferation.

Clinically these cysts may cause mechanical disturbances and produce pressure symptoms as the pregnancy advances. Operative removal of these cysts is hardly ever indicated, for as the recorded observations of obstetricians and gynecologists show, these tumors involute or disappear with the termination of pregnancy, or after the uterus has been emptied of the hydatid mole; leaving the ovaries in a fairly normal condition. As an illustration of this fact let me quote the case of a patient in the sixth month of gestation who consulted me for pain in the right lower quadrant of her abdomen. A diagnosis of subacute appendicitis had been established previous to my seeing her. I concurred in this opinion and arranged for an operation. Through a right rectus incision I removed the appendix which was chronically diseased. Not being satisfied with the pathology of the appendix as the cause of her present pain I explored the uterine adnexa and I found each ovary to be the seat of a multilocular thin walled cyst, filled with a brownish yellow serous fluid, the size of an adult's fist. I removed both ovaries, the patient made an uneventful recovery, went to term and had a normal delivery. Had I recognized then the true nature of the ovarian pathology, this patient would not have been sterilized unnecessarily.

2. A.a. *Stromatoid Tumors of the Ovary, Benign and Malignant.*— The ovarian tumors comprised under this heading are fibromas, myomas and sarcomas. Their origin and morphologic characteristics are well settled problems in the domain of ovarian pathology; we may therefore go on to the consideration of the parenchymatoid group.

2. A.b. *Parenchymatoid Benign Tumors of the Ovary.*—The histogenesis of parenchymatoid tumors of the ovary is still debatable and requires elucidation. One of the main difficulties confronting the investigating pathologist in the study of these tumors is the inability to trace successively the different links which enter into the formation of the evolutional chain of an epithelial growth. Even the earliest stages in the development of a cystoma or of an adenoma are already too advanced to be considered as the primary rudiment of the neoplasm, and must *ipso facto* be considered as an heteroplastic phenomenon, which is the end product of a proliferative process and not the beginning.

v. Klebs and Waldeyer have formulated the axiom, nearly sixty years ago, that all parenchymatous tumors of the ovary are of an epithelial origin. This teaching still holds good today, but it lacks definiteness regarding the variety of the epithelium. The theory prevalent then and up to about twenty-five years ago was, that all parenchymatous tumors sprang from the epithelium of the Pflüger

tubules. Subsequent embryologic and histologic studies have proved this theory to be false, for how can a tumor develop postnatally from a structure, which in the human, has disappeared during embryonic life?

In the fully developed ovary there are four types of epithelium (a) the surface epithelium, (b) the follicle epithelium, (c) the epithelium of the medullary tubules. and epoophoron and (d) the displaced epithelial cells. According to our latest information we know that out of these four classes, the surface epithelium possesses the greatest proliferative potency; the follicle epithelium none whatever; that of the epoophoron to a very slight degree and the epithelium of the displaced cells shows this tendency very rarely indeed, as was shown in our study of folliculoid cancer. By a process of exclusion then we must conclude that it is the germinal epithelium from which spring the most prevalent forms of ovarian parenchymatous tumors.

Adenocystoma Serosum.—The serous cysts of the ovary whether simple, adenomatous or papilliferous, whether benign or malignant, all of them have a common origin, namely the germinal epithelium. By virtue of some stimulus or stimuli, of an inflammatory or of a biochemical nature, the surface epithelium is aroused into proliferative action, and in the majority of cases the proliferation takes in an inward course into the ovarian stroma, the only exception being the surface papillomata. The histological connection between the surface epithelium and the tumors lying within the ovary may be traced in some instances.

Robert Meyer has divided the ovarian neoplasm into many subgroups each of which is of undoubted academic value histologically and pathologically. As clinicians however we must aim at simpler classifications, which are at the same time consistent with histogenetic truth, and for this reason we group all the serous cysts under one heading, as the adenomatous and the papillary varieties are only different morphologic phases of one and the same tumor.

The size, location, and manner of attachment of the serous cysts depend upon the direction in which the epithelial hyperplasia takes place. Tumors developing in the cortical portion of the ovary become intraperitoneal (in the surgical sense), they have long pedicles and are subject to twisting, which according to Küstner[14] takes place as follows: right sided tumors twist to the left and left sided tumors twist to the right. On the other hand, tumors developing toward the linea alba ovarii, i.e., towards the hilus, remain subserous, intraligamentary, are more fixed in position and have a broad base. The size of the tumors varies from that of an adult's fist to one filling the entire abdominal cavity. As a clinical guide it is safe to assume that all subperitoneal and intraligamentary cysts are serous in nature. This

clinical fact has a pathologic basis. The ciliated epithelium which forms the serous cyst is much more delicate than the pseudomucinous type, and therefore grows in the direction of least resistance, which in the ovary is the hilus.

So long as these cysts stay in their simple or adenomatous state they retain their benign properties, grow slowly, hardly proliferate, and involve only one ovary; as soon however as the papillary stage is reached the affection becomes bilateral in about 60 per cent of the cases, and with the increased proliferation, the malignant tendency rises. The papillary growths break through the cortex, metastasize, involve the visceral and the parietal peritoneum and cause ascites. In most cases, even in those tumors showing definite metastases, the pathological report is frequently benign yet clinically these patients present very often symptoms bearing the earmarks of a malignant disease. The literature records many cases of papillary cyst adenomas with peritoneal involvement which have been cured after repeated tappings, or after complete removal of the parent tumor. It is advisable nevertheless to proceed radically in all cases of papillary cyst adenoma, unless there are weighty clinical or sociological reasons to the contrary. To illustrate this fact I shall quote a personal experience.

Mrs. P. S., age thirty-seven, married, para iv, consulted me on October 15, 1915, for abdominal discomfort due to a progressive enlargement, and for relative sterility of ten years' standing. Examination revealed a huge ovarian cyst which practically filled the entire abdomen. On October 18, 1915, I removed this tumor which sprang from the right ovary. Macroscopically there were no evidences of malignancy. The postoperative course was smooth and uninterrupted. The microscopic report obtained a few weeks *postoperationem*, read papillary-adeno-carcinoma. On February 11, 1917, this patient has again consulted me regarding her abdominal enlargement, but this time it was due to a physiological amenorrhea of eight months, and on March 15, 1917, I delivered her of a full term normal baby. On June 8, 1919, she reported for a reexamination, claiming that since her last delivery she has menstruated only twice, the last time on April 26, 1918, and that she is suffering from flashes, dizzy spells and perspirations. Examination showed a retroverted uterus, and a cystic enlargement of the left ovary. I urged an immediate operation, this was refused and the patient did not return until September 21, 1919. At this time the abdomen was enormously distended with fluid and contained a large irregular semisolid tumor springing from the left half of the pelvis. An exploratory laparotomy performed on September 27, 1919, showed an inoperable papillary adenocarcinoma of the left ovary with extensive metastases and

ascites. The patient survived the operation and lived for two more years, her suffering being alleviated from time to time by repeated tapping until her death which has occurred in June, 1921.

Adenocystoma Pseudomucinosum.—Owing to the difference in the nature of the secretion elaborated by the pseudomucinous epithelium and in its morphological aspects, pathologists have claimed for this type of ovarian cystoma an intestinal mucosa origin. Even an authority like Robert Meyer is not definite on this point. He groups pseudomucinous cystoma under the heading of "Blastoma epitheliale pseudomucinosum" and attributes to it, parenthetically, a mucous membrane, a teratoid of entodermal origin.

The preceding studies have shown that the morphologic characteristics of a tumor in themselves are not sufficient to establish its histogenesis, and now I wish to add, that not even the functional attributes of its cells are conclusive evidence of its origin. It has been proved that the germinal epithelium of the ovary may become ciliated when it reaches the interior of the adenomatous spaces and L. Pick[15] stated that the squamous epithelium lining the pelvic cavity may under certain conditions assume a ciliated form. Since heterotopy may cause epithelial cells to change their morphology, why can it not under given conditions also change its functions, so that serous secreting cells may begin to secrete pseudomucin? If my reasoning is correct and it seems to be as sound as the "teratoid" or the "intestinal mucosa" theories, then the pseudomucinous cyst adenoma should remain in the category, in which it has been originally placed.

Clinically, pseudomucinous cystomata differ from the serous variety in being less malignant, since their proliferative propensities are fewer. They sometimes occur in conjunction with dermoids, and constitute about two-thirds of all ovarian cystomata. Macroscopically they are as a rule multilocular in type and reach enormous sizes. They are seldom subserous and hence have long pedicles. A clinical point worthy of note is, that while pseudomucinous cystomata are far less malignant, only two to three per cent, than the serous form, they have a much greater tendency to recurrence if not completely removed, or to implantation metastases from the spilling of their contents during operative removal. Papillary changes are rare in this type of tumor, but if present generally affect both sides in about eighty per cent of the cases.

2. B.b. *Parenchymatous Malignant Tumors of the Ovary.*—Before proceeding with a description of the tumors comprised under this heading, I wish to clear up some hazy points in the nomenclature of cancer pathology. Due to the fact that the malignant tissue lies in close proximity to the normal stroma, an error has crept into our terminology, and we often hear in our clinics the expression that a

"benign tumor has undergone a cancerous metaplasia." This pathological concept and its clinical interpretation are wrong. No normal fully developed cell can become cancerous. Cancer or carcinoma may be pathologically defined as an excessive and limitless growth of epithelial cells which have not reached developmental maturity; in contrast to a benign tumor, which represents an excessive growth of fully developed cells, and to physiological growth which is a proportionate increase of mature cells.

Adenocystoma Malignum.—This type of ovarian cancer develops in ovaries which are already the seat of a serous or a pseudomucinous cystic proliferation. The cancerous involvement may at times be so slight that it requires a painstaking search to establish its presence, or it may be so excessive as to obliterate any traces of the normal ovarian stroma. Its clinical manifestations and course have already been comprehensively discussed.

Primary Cancer of the Ovary.—Primary cancer of the ovary is much rarer than cyst-adenoma-malignum. The morphological phases under which it appears are: (a) the medullary, (b) the scirrhous, (c) the papillary, and (d) the colloid. Of these the medullary and the scirrhous are prognostically the most favorable, and the papillary the most malignant. The colloid variety has been placed by most authorities under this heading but it seems to be more appropriate to classify it under the metastatic types of ovarian cancer.

If the cancer remains solid then the ovary will retain its normal outlines or it may become rounded in form, it is always pedunculated. Ovarian cancer metastasizes by continuity and affects the adjacent structures, in contradistinction to uterine and mammary carcinoma which affect remotely lying organs.

Primary ovarian cancer is usually unilateral, and no matter what morphologic arrangement it may assume its individual cells do not differ from the cancer cells of any other organ. Cancer cells are frequently transported to the ovary by the lymphatic channels or through the intraperitoneal peristaltic waves, but the reverse seldom occurs. Whenever the tubes and the uterus become the seat of ovarian metastasis the latter acquires a stony-like hardness, which once felt leaves a lasting clinical impression.

The medullary type of cancer has a tendency to form cysts lined with a columnar epithelium, which is at times ciliated. In most instances this histologic feature is the result of a degenerative process, rather than of a proliferative nature.

Metastatic Cancer of the Ovary.—While the ovary possesses protopathic tendencies to tumor formation, it is less subject to cancer metastasis than the other organs in the body. The secondary cancer deposits met with in the ovary are associated in order of frequency,

with cancer of the stomach, of the gall bladder, of the intestinal tract, of the pancreas, of the mammary gland, and of the uterus. Proximity of the ovary to the primary focus does not seem to influence its refraction to cancer invasion. This fact is borne out clinically in cases of uterine cancer where the ovaries remain free from involvement in almost 80 per cent of the cases. It is also rare to see a recurrence in the ovaries left *in situ* after a hysterectomy for corpus carcinoma.

In contrast to primary ovarian cancer, the metastatic form is as a rule bilateral, and the ovarian tumor may exceed in size the primary focus; so that the carcinoma in the stomach may not be larger than a walnut while that of the ovary may reach the proportions of an adult's head.

The folliculoid form of cancer has already been taken up, and since the ovulogenous types do not present any clinical difficulties as far as classification is concerned, I shall proceed to the résumé.

RÉSUMÉ

1. The ovary more than any other organ in the body is subject, particularly during its active period, to tumor formation.

2. A comprehensive pathological diagnosis must be based upon histogenetic and morphologic correlations.

3. Cell arrangement and even cell function are not sufficient data to determine conclusively from which of the embryonic layers a neoplasm has originated.

4. The time factor in organic life, whether embryonic or postnatal, bears an important relation to histogenesis.

5. Embryology and histology are the basic principles upon which histogenetic teachings must be based; morphology may be the means of verifying these teachings, but it is not the end.

6. The classification submitted herewith includes these requirements quite satisfactorily without the confusion that usually arises in the clinician's mind from an excessive academic verbiage.

BIBLIOGRAPHY

(1) *Frank, R. T.:* Gynec. and Obstet. Pathology, D. Appleton & Co., 1922, p. 402. (2) *Ewing, James:* Neoplastic Diseases, 1922, p. 599. (3) *Ziegler:* Lehrbuch der speciellen pathologischen Anat., 1892, p. 839. (4) *Stratz:* Die Geschwülste der Eierstöcke, Berlin, 1894. (5) *Fritsch:* Die Krankheiten der Frauen, 1894, p. 416. (6) *v. Kahlden:* Centrl. f. Allgem. Path. u. Path. Anat., 1895, vi, No. 7, p. 255. (7) *Pfannenstiel:* Veits Handb., d. Gynäk., 1908, iv, Part 1. (8) *v. Werth:* Ziegler's Beiträg. z. Path. Anat., lix, Part 3. (9) *Meyer, R.:* Monatschr. f. Geburtsh. u. Gynäk., 1916, xliv, p. 302. (10) *Meyer, R.:* Arch. f. Gynäk., 1918, cix, 212. (11) *Frankl. O.:* Liepmann, Handb. d. Frauenheil., 1914, xi. (12) *Aschner, B.:* Die Blutdrüsenerkrankungen des Weibes, Wiesbaden, 1918. (13) *Stieve, H.:* Entwicklung, Bau und Bedeutung der Keimdrüsenzwischenzellen, München. und Wiesbaden, 1921. (14) *Küstner:* Verhandl. d. Deutsch. Gesellsch. f. Gynäk., Dresden, 1907. (15) *Pick, L.:* Berl. klin. Wchnschr., 1900, No. 10.

1125 MADISON AVENUE

SYMPTOMS AND SIGNS OF EXTRAUTERINE PREGNANCY AT OR NEAR TERM WITH REPORT OF TWO CASES AND THE TREATMENT OF LATE ECTOPIC GESTATION, TOGETHER WITH A REVIEW OF THE LITERATURE AND RECORDED CASES*

By Herman E. Hayd, M.D., F.A.C.S., M.R.C.S.Mg., and Irving W. Potter, M.D., F.A.C.S., Buffalo, New York

THE Transactions of this Society go back to 1888 and represent, as well as any other publications in the world, the activities and progress in this special and chosen field of work.

In the early volumes, no subject received so much attention as extrauterine pregnancy; in fact, the very first issue contains a symposium and each succeeding volume for a number of years contains from one to three or more papers on this important condition. The most interesting part in the discussion is in the retrospect, in estimating the advances that have been made in modern surgery since that period, to compare the bold incisions of the modern surgeon and his confidence in his technic with the small incisions and its limited field for orientation, the fear and timidity of the operator in invading the peritoneal cavity, to note the careful advice given as to how the fingers should be placed in approaching and separating adhesions and other academic questions, which the merest tyro in the surgery of today is thoroughly familiar with, and yet, the pathology and symptomatology of late extrauterine pregnancy was as well dealt with in those papers as we would deal with them today.

And why; because few men have had an opportunity of seeing cases of extrauterine pregnancy at term where the ovum had sustained the insults of early rupture and later, perhaps, secondary rupture of the sac and then had gone on developing to maturity. The symptomatology leaves room for further elucidation and more elaboration of the few features of value, which I saw during one year in Dr. Potter's practice and which suggested this paper.

We have all dealt with many cases of early rupture, in fact, up to the fourth or fifth month, but few of us have ever operated any of these cases at term with a living baby and wherein a positive diagnosis of the condition was made before operation. Many of us have operated and have reported cases wherein the baby had gone on to term and died and was removed as a mummified or calcareous product. However, obstetrical and gynecological literature contains

a history of quite a number of cases wherein a viable baby was removed at or about term and lived and did well for months and years.

A tube can rupture and the oval sac remain unbroken, but usually, when the tube does rupture, the sac is also broken and consequently, the ovum dies. Therefore, in order to have a progressive development of the embryo, it is necessary to have a sac unbroken and a maternal attachment, the site of which will depend upon the spot where the ovum happens to locate itself, and this gives rise to the various forms of late tubal pregnancies. First, and perhaps the most frequent variety, is where the tube ruptures on its under surface into and between the folds of the broad ligaments, the hemorrhage which is usually not great, is controlled in this resisting locality, the free blood is absorbed and a placental connection takes place, and the embryo goes on developing to maturity, when it is delivered by abdominal section or it dies and goes through the various pathologic changes of "adipoceration, skeletonization or calcareous transformation" or suppuration and evacuation into the bowels, bladder or other avenues of exit. Second, where the embryo is located at the isthmus or ampullar end of the tube and where the ostium or fimbriae remain firmly closed and where the embryo can go on developing to maturity without the tube rupturing, resulting in a true tubal gestation; or third, where the tube breaks and the product falls into the abdominal cavity, producing an abdominal variety, the placental attachment being in the tube or partly in the tube or on the abdominal viscera. A fourth variety is where the fertilized ovum develops in the ovary itself in the graafian follicle at the point of rupture, making that very rare form, a true ovarian pregnancy; or it may develop partly in the ovary and tube as a tuboovarian variety. No doubt, it is the location of the mature baby which is responsible for the difficulties at the time of operation; if it develops in the tube or ovary, perhaps the whole mass can be clamped off and removed, but if it has grown in the abdominal cavity and formed strong attachments to bowels and viscera, it would be impossible to enucleate it without a fatal hemorrhage and even if it grew between the folds of the broad ligament, the difficulties in its removal would be very great indeed.

Let me give the history of these two cases and then I shall endeavor to amplify the prominent signs as they appeared to me irrespective of the classic descriptions as given by other writers on this subject.

CASE 1.—E. B., age thirty-five, mother of two children, twelve and two years of age. Had one miscarriage before the birth of her first baby.

I saw her in consultation on April 21, 1921. She was up and about doing her work as usual the day before she was taken sick, in fact she went out. On returning home she complained of so much pain that she visited a neighboring doctor and the next day Dr. McDowell sent her to the Homeopathic Hospital, where I

saw her, with him, in the afternoon. Her condition was one of extreme gravity, pulse 140, temperature 100°, she was vomiting a greenish brown fluid, was very tender upon pressure over the abdomen, especially on the left side. She was distended and said she had not passed any gas since early morning and she seemed to me to be quite slow and dull in her responses. The stomach was washed and found to contain a large amount of a greenish brown fluid. One fourth grain of morphine was given at once, to be repeated in one-eighth grain doses as required and tap water slowly introduced into the bowel by the Murphy drip as long as it would be borne. On the following morning she was passing flatus freely, the vomiting had ceased and the improvement in her general condition was very marked indeed. The baby lay well out on the left side and the heart sounds were distinctly heard, but there was no uterine souffle or placental bruit, and upon vaginal examination the cervix was high up, quite hard and the os was pointed in outline but not soft, large and patulous as one would expect it to be at this period of gestation; and a hard body, the size of one's fist, could be felt a little to the right between the baby and the examining finger. She was now quite anxious to answer my questions and she told me she was about eight and a half months advanced. She had felt well during her gestation period, although at first had suffered more pains in the lower abdomen than in her other pregnancies and had seen a little blood occasionally but not enough to make her think she was menstruating and from her nausea and other symptoms she knew she was pregnant. A diagnosis was made of partial obstruction of the bowels with pregnancy complicated by a fibroid tumor low down in the pelvis.

Dr. Potter was out of the city and when he returned, in a few days, I turned the case over to him and as her condition was so much improved, he felt we might wait a short time before interfering. However, in two days, Dr. Potter called me and said the woman had suddenly taken a bad turn and when I saw her, with him, at five P. M., I felt that an operation was out of the question, and she died at eight P.M. that evening. On looking over the report of the pathologist, Dr. Thibaudeau, one can easily explain and correlate our symptoms with the pathology as evidenced at the postmortem. The mass consisted of the tube, which contained a baby weighing six and a half pounds, well formed and perfectly developed and evidently dead but a few days. The mass could be pretty well lifted up and the bowels, although quite adherent at different points, might have been easily separated and the whole product clamped off at both ends, tied and delivered. The woman evidently had been in spurious labor, which thinned out and weakened the wall of the sac, because a rent was present, about two or three inches in length, in the thin, distended part of the tube and quite a lot of blood clots and fluid, no doubt liquor amnii, were present in the peritoneal cavity. When Dr. Potter first saw the case he heard no fetal heart sounds and therefore questioned my diagnosis. The baby, no doubt, had died sometime during the two days I saw her, and the sudden collapse of the woman while under Dr. Potter's care is explained by the breaking of the sac wall and the sudden flow of liquor amnii and blood into the peritoneal cavity.

The following is the report of Dr. Potter's second case. I saw this woman for the first time three weeks after operation.

CASE 2.—Mrs. B. M., age thirty-eight, one child eleven years old. One miscarriage occurred two years after her first baby was born. She was always regular and had little or no pain at her periods.

About six weeks after having missed her menstrual period her regular doctor saw her, when she passed a small mass which appeared to be made up of blood and some fibrinous material, there was little pain and no shock, and an examination of the

specimen disclosed a clot of blood and decidual membrane. In the course of a few days she got up and attended to her usual household duties. She had felt well up to about seven and a half months, when she had an attack of vomiting and began to suffer agonizing pains, especially in the left side and back and was distended with gas and had obstinate constipation. In a few days these symptoms became alarming, a general surgeon was called, and a diagnosis was made of partial obstruction of the bowels, complicating pregnancy. Under appropriate treatment she improved somewhat, but the pains continued, and after five weeks, she was sent to the Deaconess Hospital, where Doctor Potter saw her. One week later, he opened the abdomen, expecting to perform a caesarean section under the diagnosis of a fibroid tumor, complicating pregnancy; but, after the abdomen was opened, he at once saw that he had an extrauterine fetation in the right tube, and the uterus was about the size of a goose egg, pushed down low, and to the left side, under the mass. He opened the gestation sac and delivered the baby and proceeded to deliver the placenta, when he was compelled to desist, as the hemorrhage was so profuse. He packed the sac with iodoform gauze, and closed the abdomen. He made no attempt to remove the tube with its contained sac, as the bowels were very adherent to it. Mother and baby did well, and since birth, the child has thrived beautifully and is in every respect a nicely developed baby; but for a few weeks there was a slight contraction of the head, toward the right side. This got less as the child grew older and is now absent altogether.

It will be noted in these two patients, there were none of the signs of a violent rupture of the tube at the sixth, eighth or tenth week, the women had not lost blood in the early weeks to make them doubt that they were pregnant and their condition was much as it is with other women in the early months of intrauterine gestation. They continued to be about until the adhesions which had taken place between the bowels and the fetal envelope had caused the sudden and alarming symptoms of partial and even complete obstruction. Obstruction of the bowels is a very rare and even unknown occurrence in a pregnant woman, if she has never had a previous intraperitoneal operation, because the pregnant uterine body is smooth and freely movable and is lifted up and adjusts itself to the distending influences of bladder and bowels in its progressive development.

In neither of these cases were we (the attendants) impressed by the loud heart sounds and their more superficial character, nor by the fact that the baby lay mostly to one side and that the extremities were more palpable and other signs and symptoms as given in the classical descriptions of this condition; but we were impressed, that on vaginal examination, we felt a cervix harder in consistence and outline than one would look for in a uterus at term, and we were struck with the resistance to the examining finger of a hard body which felt like a small fibroid tumor low down in the pelvic outlet. As a result, the diagnosis was made of fibroid tumor, in both cases, complicated with pregnancy, and operation was advised when the physical condition of the patient justified the undertaking.

It is needless for me to say that we all recognize the necessity of making an absolute diagnosis without confrontation, but it is also

desirable, for the surgeon's protection from unkind criticism of the laity, that we, at all events, express our suspicions as to the possibility of there being present other pathologic conditions simulating the one under consideration. A very serious situation immediately presents itself: if the woman be pregnant intrauterine, even in the presence of an obstructing fibroid, her baby must be left undisturbed until labor sets in or until there is the strongest assurance possible that the baby is strong and viable; but if the fetation is extrauterine then there is room for serious discussion and surgeons differ as to the best methods of procedure. After looking at the question from every angle and studying recent statistics and the successes of modern operators, it seems to me, the position we must take, as a general proposition is, in every extrauterine pregnancy the embryo should be removed as soon as the diagnosis can be made, whether there be life or not in the aberrant product in the greater interests of the more important body, the mother. This position should be taken in most cases up to the seventh month, after which, if the mother is in good condition, in fact, is not conscious that she is carrying an extrauterine baby, as she has had so few unnatural or distressing symptoms and can be carefully watched and frequently brought under observation, the product may be left until it is stronger and with a greater prospect of living, perhaps until labor is about to set in, but never in the hope that spurious labor is to set in to kill the baby, so that it can be removed some time later when the placenta may be loose and more easily delivered.

To leave a baby in the belly to die with the expectation that favorable degeneration will take place is, to my mind, unscientific and most undesirable in the interests of the woman and her progeny and in any other locality and for any other condition would be altogether at variance with modern surgical principles. Admitting therefore, that under favorable conditions, we are sometimes justified in withholding surgery after seven months, in the interests of the child, we must ever be mindful that we can give no real assurance that the baby will remain innocuous in its acquired envelopes and the mother will be free from danger for some weeks or months, or that an operation will be less hazardous when spurious labor sets in, or that hemorrhage, if an attempt be made to remove the sac and placenta at the time of the operation, will be less severe. Then, too, we know that extrauterine babies, who have been removed by operation, are not likely to live longer than a few days and if they do and have survived the first weeks of worldly existence, have we ample proofs that they will be strong and healthy mentally and physically in adult life; or are they not so seriously deformed, in a large

majority of the cases, that they become an unfair worry to their families and an increasing care to themselves as they grow older?

Therefore, increased risks and unhappy disappointments should not be invited simply in the hope of getting a living baby, as our social order with its strenuous competitions demands babies to start in life without hazards and on an equal footing with their fellows. I realize that religious and false sentimental grounds may offer a specious argument for the salvation of all living souls. Nevertheless, we do know that some of these babies have grown up to be strong and useful men and women and therefore, the longer they can be left, all things being equal, the more vigorous will the child be and the better for survival will they be after birth. Then, too, it is maintained and perhaps on good grounds, that an extrauterine pregnancy that has passed the sixth or seventh month is so well surrounded by a thick connective tissue covering that the dangers of secondary rupture and even other complications are not great, but I am not prepared to accept these claims nor are they borne out by facts, nor were they borne out in our two cases.

When death has taken place before the surgeon's arrival, I believe the first indication is to remove the dead baby as soon as possible, because, until the surgeon opens the abdomen, he cannot tell what disposition can be made of the placenta, whether the whole mass, sac and placenta can be delivered without great danger or whether it would be best to leave both sac and placenta because of the dense and general attachment to adjacent structures, or to simply remove the fetal product and pack the sac with iodoform gauze 5 per cent, or to sew the sac to the edges of the incision or the abdominal wall and then wait until Nature dictates what course shall be pursued later. Perhaps no infection will result and the placenta in time may be absorbed or degenerate into a lime inundated mass, which may be removed later or it may separate and finally get loose in the bottom of the wound and can be lifted out without danger, or suppuration may set in and serious sepsis may follow, conditions which must be met by recognized surgical treatment.

If the mass can be clamped off on each side at the infundibulopelvic ligament and at the uterine end of the tube and the broad ligament, it might be safe to remove the placenta as it was in Werder's case reported by him in the Transactions of this Association in 1908, with very little oozing or loss of blood and yet, in his other two cases the bowels and adjacent structures were so agglutinated to the mass that clamping was impossible and he did what many other operators have also done, tried to remove the placenta. He encountered such a terrific hemorrhage that the patient died soon after leaving the operating table, and such would have been the result if Potter had not packed the

cavity with iodoform gauze and closed the incision, because when he tried to separate the afterbirth, the bleeding was very great and alarming.

The placenta, no doubt, in Potter's case shriveled up and portions of it became absorbed or what remained had taken on calcareous degeneration as is sometimes the case in an old retained piece left in the uterus and under favorable conditions, later, it can be removed by abdominal section if it causes any further trouble. Of course, such a good result does not always follow, because Dunning's case, as reported in the 1899 Transactions, began to suppurate, sepsis set in and on the eighth day, because of impending death, he pulled on the cord, which he had left hanging out of the incision, and the woman died in a few minutes from a severe hemorrhage.

Another interesting case, Dr. Bonifield reported at our 1906 meeting in Cincinnati and which does not appear in our Transactions. He showed a well nourished boy about two years of age, who was in perfect physical condition, with a band-like mark around his forehead. The mother was brought into the hospital in the middle of the night with a diagnosis of extrauterine pregnancy at term. She was in labor and was given a hypodermic of morphine and the next day the doctor operated. He found the pregnancy in the right tube. The mass could be well lifted up and the doctor did a supravaginal hysterectomy, commencing from the left side and tying off the ovarian artery, round ligament and uterine artery on that side and after cutting through the neck of the uterus, he clamped off, high up, the right uterine and ovarian arteries and was able to shell out the whole gestation sac with little or no bleeding. The child's head seemed to be protruding through the fimbriated end of the tube and where this end of the tube surrounded the head, there was a compression in the skull and the head was flexed backward until the occiput rested between the shoulders. This flexion, however, was entirely overcome before the mother left the hospital. The boy has grown up to be a fine young fellow.

Kirchner, in the 1909 Transactions, reports a case of ovarian pregnancy in which he was able to clamp and tie off the whole mass. The mother and baby did well. The child was a full term male baby, mulatto, fully developed, with no deformities, but somewhat poorly nourished. He was brought up by artificial feeding and thrived and at the end of ten months mother and baby were in good health. This is the only case reported in our Transactions (1888 to 1921), where a living baby, located extrauterine was delivered alive and lived for any length of time. It was therefore, an unusual experience for me to have seen two cases in one year, which occurred in Dr.

Potter's practice and both of them were the first he had encountered in his large obstetrical service.

To me, the crux of the whole problem is, what shall be done with the placenta; and I am satisfied there can be no hard or fast rules laid down to govern the surgeon. I think the best surgeons today let it alone, *in situ,* if the sac can't be adequately clamped off and the whole mass removed; and then if it sloughs, treat it as we would any other sloughing wound in which suppuration and sepsis occurs. Of course, these are most undesirable complications but they give a better outlook for ultimate recovery than to tear away a placenta from its firm bed of attachments and have a primary fatal hemorrhage.

And now, in closing, permit me to summarize this important subject and try to confine, if possible, our discussion to the signs and symptoms of extrauterine pregnancy at or near term and its surgical treatment.

First, the diagnosis of extrauterine pregnancy at term should be made and vaginal examination reveals the most important sign, namely, a cervix although soft, has not the characteristics of a cervix at term with an intrauterine product, and above it can be felt a hard body which is the uterus, perhaps pushed to one side.

Second, a history of bowel obstruction, as in our two cases, is of great importance.

Third, extrauterine fetation always calls for surgical relief and the operation should be undertaken just as soon as a diagnosis is made, whether the embryo is viable or not. If, however, the case has passed beyond the seventh month, the surgeon may wait until the baby is stronger, providing the patient is in good condition and can be seen often and can be kept under the closest observation.

Fourth, I do not believe the woman should go into spurious labor and wait for the death of the baby to take place and then leave it to adipocere or take on the more or less favorable changes which it sometimes does, because such a course could only help in the delivery of the placenta, the sac would probably be just as adherent to the surrounding structures and if attempts were made to separate it, a fatal hemorrhage might take place.

Fifth, if the mass can be tied off at both ends, an attempt should be made to remove the sac and placenta, which perhaps will be possible if the pregnancy be tubal or tuboovarian, but if there be much oozing or bleeding, the sac should be packed with 5 per cent iodoform gauze and the placenta be left *in situ* or the sac can be sewed to the abdominal wall, where very great caution must be exercised not to disturb the placenta by pulling or tugging on it, until it is free in the sac cavity: in fact, let Nature make such disposition of it as she will and if suppuration or other complications set in, they must

be met as would such complications in other places on general surgical principles.

We have brought together a record of sixty-two authentic cases of extrauterine child, born alive, and living 30 days or longer, and mother surviving.

REVIEW OF THE LITERATURE AND CASE REPORTS

Sittner, (Brandenburg) collected a total of 179 cases where extrauterine pregnancy went to term (*Arch. f. Gynäk.*, 54:526, 1901. *Centr. f. Gynäk.*, 27:33, 1903. *Arch. f. Gynäk.*, 84:1, 1907).

Howard Kelly gives a table of 77 cases in his "Operative Gynecology," 1898, Vol. 2, pp. 458-59, but all of these are included in Sittner's study.

Joseph Delcamp in his "Grossesse Ectopique avec enfant vivant," Paris, 1918, gives 47 cases, but 12 of these are on Sittner's list.

E. A. Ayers gives a list of 149 cases (from 1880 to 1898) in "Obstetrics," Vol. 1, p. 87, Jan., 1899.

The following list of 63 authentic cases represents extrauterine pregnancies where the child was born alive and the mother survived and the baby lived one month or more.

CASE 1.—Muller, 1809. (*Bull. Sc. Med.*, Paris 1811, 8, 406.) (Cited by Sittner.) Twenty-four years old, in labor for several days. After reaching conclusion that fetus was not "in the uterus but in the left ovary between the tubes", abdomen was incised, fetal sac incised, child and placenta extracted. Mother and child survived.

CASE 2 and 3.—Gardian, 1816. (*Traité complete d'Accouchements*, Paris, i, p. 518). CASE 1.—The labor was just beginning and the child was fully developed in the tube. The delivery was made by Brewer of Leipsic by gastrotomy.

CASE 2.—This case was reported to the Paris Academy of Surgery. One child was in the intrauterine position; while this was being delivered a second child was recognized in the abdomen. The abdomen was incised and both mother and child were saved.

CASE 4.—King, John, 1817. (*New York Medical Repository*, n. s. 111, 288). The patient had been four days in labor and delivery was effected by a large incision of 5 to 6 inches through the vagina, carried downward and backward. The descent of the child was aided by contraction of the abdominal muscles and with the aid of forceps and external pressure by assistants, delivery was completed. The child had to be revived by artificial respiration. The intestines were herniated through the wound on the third day, but the mother was able to be about on her feet in two weeks.

CASE 5.—Schreyer, Hamburg, 1837. (*Sept. Monatschr. f. Geburtskr'k. u. Frauenkr.;* 14.) (Cited by Sittner.) The patient was aged forty-two years, iii-para. The last previous confinement was thirteen years before this time. There was slight menstrual flow in the first three months. In the last six months there was great discomfort. The fetal parts were distinctly palpable. Extraction of the fetus was done through a median line incision. The placenta was expelled through the wound by the force of the labor pains. Both mother and child recovered.

CASE 6.—Jessop, T. R., 1876. (*Obst. Trans.;* London, 1877, xviii, 262.) The patient was twenty-six years of age and had had one child delivered normally. The patient's symptons were abdominal pain with vomiting, constipation, fever and a hard swelling in the lower side of her body. Delivery was effected through a 6" incision in the median line of an extrauterine gestation. The back of the child was covered with omentum. The funis passed transversly across the wound and around the left thigh of the fetus to its umbilical attachment. The child was lodged in the midst of the bowels and free in the abdominal cavity. The placenta covered the inlet of the pelvis, "like the lid of a box", being attached to part of the large bowel and posterior abdominal wall. It was left in situ and for a month there was a profuse offensive discharge from the wound. Healing occurred on the seventy-second day after the operation. The child lived for 11 months and died from croup and inflammation of the lungs.

CASE 7.—Matthieson, 1884. (*Brit. Med. Jour.,* May 24, 1884, i, 999.) The patient was thirty-five years of age and had five living children. The symptoms during the pregnant period were those of extrauterine gestation. Delivery was undertaken by vaginal incision without anesthesia. It was a face presentation and forceps were used to aid delivery. The child was easily revived. The placental attachment was on the posterior left side of the cavity 2" from the vagina. It was easily detached and bleeding was controlled by sponging with perchloride of iron. Blood clots were removed from the cavity. The patient was much exhausted. The child weighed 8 pounds 7½ ounces and the placenta was three-lobed. The wound healed in three months. Both mother and child recovered.

CASE 8.—Treub, H., 1887. (*Zeitschr. f. Geburtsh. u. Gynäk.;* May, xv, 2.) The patient was thirty-four years of age, ii-para. She had frequent attacks of pain during her pregnancy and expelled decidua in the fourteenth week. In her sixth month, she had peritoneal symptoms. Operation was performed two to three weeks before the end of pregnancy by an abdominal incision. The placenta was pierced by the hand and the child was extracted, and the portion of the sac containing the placenta was split from the parietal peritoneum by blunt dissection. Part of the sac which was firmly adherent to the intestine was not removed. Both mother and child recovered.

CASE 9.—Olshausen, R., 1888. (*Deutsch. med. Wchnschr.,* Nov. 1890, No. 9.) (Cited by Sittner.) Thirty-year-old para ii. Previous confinement seven years before. Symptoms of abdominal pain, fever, expulsion of some membrane continued to the end of pregnancy. Operation was performed 18 days before term by a median incision. The child was free between the intestines and was without any sac. There was no amniotic fluid but coagulated blood was found between the viscera. The placenta was partly free in the abdominal cavity and partly attached to the right lateral ligament. The child weighed 5 pounds. Both mother and child recovered.

CASE 10.—Taylor, J. W., 1891. (*Trans. Obst. Soc.,* London, xxxiii, 115.) Patient aged thirty-five, para v. The youngest child was eleven years of age. Symptoms of irregular hemorrhage and abdominal pain. Tubal pregnancy was diagnosed. Delivery was effected by left lateral incision directly over the child's head. The child was without a sac and free in the abdominal cavity except for a cover of the omentum. The placental attachment was in the pelvis to the right of the median line. The cord was drawn through the incision and the wound sutured around the cord and a glass drainage tube. The wound was re-opened 12 days later and the putrid placental mass was thoroughly removed. An alarming hemorrhage followed. Also thrombosis and septic temperature. Recovery occurred in three

months. The child weighed over 7 pounds. Its head was deformed and neck depressed on the right side. There was deformity of the right foot and right leg. Death of the child occurred through convulsions at the age of five months.

CASE 11.—Rein, G., 1892. (*Centralbl. f. Gynäk*, No. 50.) (Cited by Sittner.) Thirty-five-year-old para v. Symptoms began in the second month, with hemorrhage, collapse and illness and lasted 1½ months. Operation was done in the thirty-eighth week by abdominal incision. The placenta was anteriorly situated. Hemorrhage was controlled by compression and ligature of the vessels. Fetus was extracted without its membrane, after the manner of an intra-ligamentary cyst. Glass drainage was put in the wound. The decidua was expelled two days after operation. The child weighed 3,200 grams. Mother recovered. Child still living.

CASE 12.—Frommel, R., 1892. (*Münchener med. Wchnschr.*, June, 1891, No. 1.) (Cited by Sittner.) Thirty-one-year-old para iii. Symptoms: from the fifth month there was much discomfort, confining the patient almost constantly to bed. Operation was performed in the forty-ninth week, after cessation of menstruation. Incision was made through the median line and the child was found in a subserous, intraligamentary position involving the mesentery of the large intestine. The mesentery of the colon was resected and the vessels ligated. An attempt was made to enucleate the sac and the placenta but this was unsuccessful. Hemorrhage had to be controlled by tampons. The mother became pulseless but recovered. On the fifth day there were symptoms of iodoform poisoning. The placenta was removed seven days after the operation and its removal was followed by a violent hemorrhage. Later a fecal fistula developed. The mother recovered. The child weighed 1880 grams, showed a contracture of the right sternocleido muscle, and also a depression on the left side of the skull. Its death occurred at four and one-half months from gastric catarrh.

CASE 13.—Urbain, La Bouverie, 1893. (*Bull. de la Soc., belge de Gyn. et d' Obst.* 1893.) (Cited by Sittner.) Para ii, age thirty-three years. The last confinement was thirteen years previous. In the fourth month there were violent peritoneal symptoms. Operation was delayed notwithstanding an early diagnosis until the fortieth week. A thin-walled fetal sac was found behind the uterus. The sac was ruptured and considerable hemorrhage occurred. Extraction of the fetus and removal of the placenta was accomplished. Violent hemorrhage was checked by clamping and tamponing. Only a part of the sac was removed and the abdominal wound was partly closed. Recovery occurred.

CASE 14.—Rein, 1894. (*Monatschrift f. Geburtsh. u. Gynäk*, Aug., 1897.) (Cited by Sittner.) The patient was a thirty-three-year-old primipara. The operation was done in the thirty-fourth week. Fetus was extracted and the placenta removed. The sac was ruptured and tamponed. The mother recovered and the child lived for two years.

CASE 15.—Pestalozza, E., 1895. (*Annali di Ost. e. Gin.*, July, 1895.) The patient was a thirty-three-year-old para iii, her last confinement being one and one-half years previous. During the second month the patient had hemorrhage for fourteen days with pain and loss of consciousness. These symptoms recurred frequently. Labor-like pains necessitated an operation in the thirty-eighth week. The fetus was uncovered and found free in the abdominal cavity. Extraction was accomplished and the fetal sac containing the placenta was removed from an intra-ligamentary position. Ligation of vessels and of the ligament was done. When the sac and placenta were removed the hemorrhage was so violent that total extirpation

of the uterus was done. The mother recovered. The child was slightly deformed but lived.

CASE 16.—Herff, O., 1895. (*Zeitsch. f. Geburtsh. u. Gynäk.*, xxxiv, 1.) (Cited by Sittner.) Twenty-nine-year-old para iii. Last confinement eight years previous. Symptoms violent hemorrhage in the early part of the pregnancy and later peritoneal symptoms accompanied with discomfort, vomiting, difficulty in breathing. Operation in the thirty-third week. The fetal sac was torn on the median side and the fetus was without covering and free between the intestines. After removal of the fetus adhesions were separated, blood vessels ligated and the sac and placenta were removed. Considerable hemorrhage followed but this was checked by gauze compresses. Convalescence was accompanied by fever and venous thrombosis. The mother recovered. The child was deformed and died three and one-half months after birth.

CASE 17.—Tauffer, E., 1895. (*Centralbl. f. Gynäk.*, 1896, No. 1.) (Cited by Sittner.) The patient was a thirty-year-old iv-para, whose last confinement was 2 years previous. In the third month violent pains with fever and loss of consciousness, also bladder disturbances occurred. Operation was done at the end of pregnancy. Through an abdominal incision a fully developed sac was found behind the uterus at the right from the lat. ligament. The fetus was removed and violent hemorrhage followed after partial separation of the placenta. Ligation of the right lat. ligament, spermatic and uterine arteries, was done and drainage established through the vagina. Convalescence was complicated by thrombosis in the left leg. The mother recovered but the child, which was deformed, died after four months.

CASE 18.—Ludwig, H., 1896. (*Wiener klin. Wchnschr.*, No. 27.) (Cited by Sittner.) Para vi, thirty-five years of age. Symptoms began in the third month. At term one child was delivered spontaneously and another child was observed in the abdomen. On the fifth day the patient travelled for seventeen hours to Vienna for operation. Through a median incision there was found a thin sac of fetal membrane and ovarian tissue, and on the under side the placenta was adherent to the uterus. The sac was incised and the fluid escaped. The fetus, uterus, sac and placenta were successfully removed. The mother and both babies lived.

CASE 19.—Sacchi, P., 1896. (*Gazetta med. Cremon.*, June, 1897.) (Cited by Sittner.) Thirty-one-year-old iii-para. Last confinement ten years previous. In the early months the patient had great discomfort and continued hemorrhage. Operation was done in the thirty-third week and the fetus was uncovered between the intestines and removed but the placenta was left behind. It was inserted into the pouch of Douglas and the right lat. ligament. The decidua was expelled on the third and fourth day after operation. The mother and child both lived.

CASE 20.—Rokitansky, C., 1897. (*Centralbl. f. Gynäk.*, 1898, No. 13.) (Cited by Sittner.) Thirty-six-year-old para-iii. Last confinement was one year previous. Symptoms violent pains, absence of menstruation for five months. Operation in the thirty-sixth week. The fetal sac was adherent to the intestines. The sac was ruptured but it contained very little amniotic fluid. Both the fetus and placenta were removed and violent hemorrhage followed which was controlled by tamponade. The sac was partially ligated. The mother recovered and the child lived but was badly deformed and was partially paralyzed.

CASE 21.—Charles, N., 1897. (*Jour. d' accouchements, Liege*, 1897; 18, p. 453.) Extrauterine pregnancy in a previously healthy primipara. Laparotomy at term.

Mother and child both lived. The mother had a subsequent pregnancy which was intrauterine with normal termination.

CASE 22.—Benchiser, A., 1899. (Cited by Sittner; private communication, 1906.) Tripara twenty-nine years of age. The last confinement fourteen months previous. Symptoms hemorrhage during the first three months, at the menstrual period. The patient passed through a state of collapse in the third month. In the last stages of the pregnancy there was involuntary defecation and strangury. Operation was done in the last week of pregnancy. The sac was incised and the fetus removed. The placenta was found adherent to the transverse and the descending colon. The placenta and greater portion of the fetal membranes were removed. The right lig. lata was ligated and the uterus extirpated. The mother and child both lived.

CASE 23.—Cragin, A. B., 1900. (*Am. Jour. Obst.*, 41; 740.) Patient was twenty-four years of age. Symptoms of pain and bleeding during three months. At operation an intra-ligamentous gestation was found with the right tube passing over the middle of the upper surface of the sac. Living child was removed and the placenta left in situ. The placenta completely came away in twenty-four days. The child and mother both lived.

CASE 24.—Sneguireff, 1900. (Cited by Sittner from a private letter.) Thirty-year-old para-iii. The pregnancy was without discomfort. Operation was performed about the thirty-second week. The fetal sac was intraligamentary and the placenta was extracted rapidly, and the spermatic vessel was ligated. The larger part of the sac was extirpated. The mother recovered and the child is still living.

CASE 25.—Cragin, A. B., 1900. (*Am. Jour. Obst.*, 1901, xliii, 96.) Patient aged thirty-three years, had had two miscarriages. Symptoms abdominal pain, alternating constipation and diarrhea. The gestation was found within the folds of the left broad ligament and the sac was ruptured. A living child was delivered. The mother and child both lived.

CASE 26.—Winter, A., 1902. (Cited by Sittner, private letter.) Twenty-six-year-old para ii. Operation in the twenty-first week. The sac filled the entire pouch of Douglas. The sac was adherent to the uterus and right lateral ligament. The left uterine cornu and the spermatica were ligated. The sac was removed from the pouch of Douglas with a living fetus. The mother recovered.

CASE 27.—Winter, A., 1902. (Cited by Sittner.) Thirty-four-year-old primipara. Symptoms of sudden abdominal pain in the fourth month with moderate bleeding. Operation about the twenty-fifth week. The sac was enucleated and a living fetus was extracted. The placenta was removed from the anterior wall of the sac. The tubal sac was unruptured. The mother recovered.

CASE 28.—Perles, 1901. (Cited by Sittner, private communication.) Thirty-eight-year-old primipara. Symptoms in the third and fourth month of pain and moderate bleeding but no collapse. Operation was performed in the 40th week. The tubal sac was found unruptured and was mostly in an intraligamentary position and firmly adherent. The fetus was removed and placenta, and as much of the sac as possible. The mother recovered. The child had a depression of the left side of the skull, deformity of the right elbow and of the lower limbs. The child was living at 14 months.

CASE 29.—Perles, 1902. (Cited by Sittner, private communication.) Thirty-two-year-old para-iii. Last confinement ten years previous. There were symptoms of collapse and bleeding in the third month. Her labor began in the fortieth week.

At operation a fetal sac was found in a partly intraligamentary position and firmly adherent. Part of the amniotic fluid had escaped into the peritoneal cavity. The fetus was removed and as much of the sac as possible. The mother and child are both living.

CASE 30.—Fischer, A., 1902. (Cited by Sittner, private communication.) Twenty-six-year-old para-ii. Last confinement seven years previous. Symptoms of violent abdominal and lumbar pains in the early part of the pregnancy. Operation about the thirty-eighth or fortieth week. The fetus was found within an intact tubal sac which was adhering to the uterus and intestine. The placenta and child were delivered and no ligaturing of vessels was required. The sac was sutured in place. The mother recovered and the child lived for two years.

CASE 31.—Calderini, G., 1903. (*Atti d. Soc. ital. di Ost. e. Gin.* Oct., 1903, iv.) (Cited by Sittner.) Forty-year-old para-v. Last confinement eight years previous. Symptoms gave but very slight discomfort. Operation was done in the forty-second week. The uterus was found adherent to the peritoneum in the abdominal cavity The fetus was removed and the placenta and sac could not be removed on account of their insertion deep in the right pelvis. A decidua was expelled on the seventh day after the operation. Patient was discharged eight weeks after the operation but had a discharging fistula. The placenta came away through the fistulous tract four and one half months after the operation. The mother recovered and the child is still living.

CASE 32.—Perlis, W. (*Centralbl. f. Gynäk.*, 1903.) (Cited by Delcamp.) Primipara, age thirty-eight. Symptoms of pain and bleeding during the first months of pregnancy. Operation was done ten months after the cessation of menstruation. The placenta was extirpated. The mother recovered and the child lived but was greatly deformed having a flattened skull and no motility of the shoulder joints. It also had club feet. It was living fourteen months after birth.

CASE 33.—Schmidt, 1903. (*Wien. klin. Wchnschr.*, 1904, No. 19.) (Cited by Sittner.) Para iii, age thirty-two, violent abdominal pains at third and seventh months. Labor-like pains for four weeks. Uterus displaced to right by tumor reaching to ensiform. Operation thirty-seventh week, peritoneal cavity full of liquor amnii and vernix. Live male child extracted, 2550 gm., survived. Fetal sac formed by left tube adhering in pouch of Douglas. Extirpated, including placenta. Violent hemorrhage, tamponade. Recovery uncomplicated, decidua expelled nine days after operation.

CASE 34.—Popoff, D., 1904. (*Russk. Wratsch.*, 1905, No. 27-29.) (Cited by Sittner.) Twenty-year-old para iii. The last pregnancy was four years previous. At the end of the second month there were six weekly hemorrhages. In the fourth month violent pain and loss of consciousness. In the remaining months the patient was ill and uncomfortable. Operation about the fortieth week. The fetal sac was found reaching to the ensiform process and communicated with the intestines and omentum. The uterus was enlarged, elevated and was adhering posteriorly to the anterior surface of the sac. The left tube passed over the sac while the right tube and ovary were adherent to the sac. The intestine was also adherent to the sac. The adhesions were partly freed, the left tube ligatured, sac incised and the fetus removed. Violent hemorrhage occurred and was checked by a clamping and by ligature of the spermatica. The sac and placenta were removed in toto. The patient recovered rapidly after a slight lung infection. The child was deformed and died after five years from intestinal catarrh. In this case the fetal sac contained the placenta. The wall of the sac contained follicles and corpora albicantes. This was a left ovarian pregnancy.

Case 35.—Michin, P. W., 1905. (*Russk. Wratsch*, 1905, No. 12.) (Cited by Sittner.) The patient was thirty-eight years of age, para iv. Her last pregnancy was thirteen years previous. The early symptoms were abdominal pains. The later symptoms compelled operation at about the thirty-ninth week. The fetal sac was found adherent to the abdominal viscera. The fetus was removed and also the placenta, without hemorrhage. Part of the sac membrane was removed and the remaining part sutured and tamponed. Both tubes and both ovaries were normal and not involved in the sac formation. The mother recovered and the child died one month after birth. This was considered a case of primary abdominal pregnancy.

Case 36.—V. Ott, 1905. (Reported by Landau and Jacobson in a private communication.) (Cited by Sittner.) Thirty-six-year-old para ii. Last confinement eleven years previous. The symptoms were hemorrhage, violent attacks of pain and fever. Operation was done in about the thirty-seventh week. The fetus was found in the fetal membranes in the pelvic cavity. The lower portion of the sac was formed from the enlarged ruptured tube and adherent intestines. The sac was incised, the fetus extracted and the placenta, which was inserted in the posterior wall of the uterus and in the intestines, was separated. The wound was tamponaded. The convalescence was febrile and complicated by exudates. The mother recovered and the child lived.

Case 37.—Jerie, J., 1905. (*Casop. lek. cesk.*, 1906, p. 913.) (Cited by Sittner.) Para v of thirty-seven years. Her last pregnancy was seven years previous. Her symptoms were those of sudden pain, loss of consciousness and vomiting. Three weeks before her operation there were labor pains which were repeated in thirteen days. The operation was done in the forty-third week and the child was found to the right and beside the enlarged and elevated uterus. The sac had formed of the ruptured tube and of pseudomembranes which were adherent to the left adnexa and the right margin of the uterus. The upper part was adherent to the posterior surface of the pouch of Douglas and the intestines. The sac was incised and there followed a slight flow of amniotic fluid, and also a violent hemorrhage, from the sac and ruptured placenta, the latter being inserted into the ampullary portion of the right tube, ovary, Lig. latum, rectum and mesentery of the small intestine. The hemorrhage was checked by ligature. The sac and placenta, excepting a small portion, were removed, along with the left tube. The puerperium was complicated with pneumonia and suppuration of a hematoma. The remainder of the sac expelled through the wound. The child was deformed in the face, feet and hip joint. It is still living.

Case 38.—Popoff, 1905. (*Wratsch*, 1905.) (Cited by Delcamp, p. 54.) The patient was twenty years of age and had had two miscarriages. Her symptoms were abdominal pain, nausea and vomiting. The operation was performed in the eighth month. The fetal cyst was found to be very adherent and vascular and the placenta had a pelvic insertion. The cyst, placenta and adnexa on the one side were all extirpated and a living child delivered. This was proved histologically to have been an ovarian pregnancy. The mother recovered and the child lived.

Case 39.—Landau, T., 1906. (*Berl. klin. Wchnschr.*, 1906, No. 32.) (Cited by Sittner.) The patient was thirty-nine years old and a para v. Her last confinement was eight years previous. She had had an ovariotomy six years previous with an illness of several months from gauze left in the abdomen. The pregnancy symptoms began in the second month, with violent attacks of pain, loss of consciousness and vomiting, followed by ileac symptoms. Later there was decrease in weight, loss of strength and continued discomfort. Labor pains were artificially induced without result. An operation was done in the thirtieth week. There was

much difficulty in severing adhesions. In attempting to remove the sac it fell
out and the amniotic liquid escaped. The fetus was extracted, the sac removed and
the vascular part of the upper portion of the sac was ligated. The right ureter
passed over the left side of the sac and had to be pushed aside. The base of the
Lig. latum was ligated and the sac and its contents were removed. The wound
area was tamponaded and an abdominal hernia was incised. The mother recovered
and the child lived but had left torticollis. The mass removed with the child
consisted of the sac, covered with adhesions, the wall being fibrous tissues with
bundles of smooth muscle and placenta and fetal membranes. A portion of the
tube was observed on the outside of the sac. A part of the tube was dilated to
about the size of a fist and showed microscopically long hairs and foreign body
cells in the meshes of a fibrous reticulum.

CASE 40.—Landau, T., 1905. (*Deutsch. med. Wchnschr.*, 1906, No. 30.) The
patient was a para ii of thirty-four years. Her last pregnancy was fourteen
years previous. The symptoms of her pregnancy were discomfort, violent attacks
of pain and peritoneal symptoms. There was retroflexion of the uterus and the
complication of a left hematocele. Fetal movements were felt in the fifth month.
In the thirty-second week there was a violent attack of peritonitis. In the fortieth
week violent pain occurred with marked swelling of the abdominal tumor. The
cervix was opened and the uterus was found to be empty. Further operation
revealed the sac, which fell out and a large quantity of the amniotic fluid was
expelled. A violent hemorrhage was controlled by compression of the aorta. The
fetus was removed and the placenta was found in the posterior wall of the sac,
being ⅓ in the true pelvis and ⅔ in the abdominal cavity. It was dissected
free and removed. The sac was formed of fetal membrane and numerous adhesions
to the abdominal and pelvic viscera. It was removed with gradual torsion of the
Lig. latum. The mother recovered after thrombosis of the left leg. The child
was reported as still living.

CASE 41.—Jacomet. (*Echo med. du Nord.*, June 23, 1907.) Primipara, age
twenty-six, who had had a previously unoperated salpingitis. During the first
five months there was pain and nausea. In the eighth month the patient had pains
simulating those of labor. Laparotomy revealed a placenta inserted on the uterine
wall. The child was removed. The mother recovered. The child lived but had
atrophy of the toes.

CASE 42.—Lockelt, G. V., 1908. (*West Canada Med. Jour.*, Oct., 1908, ii, 475.)
The patient was thirty-four years of age and had had four previous normal
pregnancies and one abortion. Her symptoms were those of morning sickness, pain
and hemorrhage. In her sixth month an elevation of temperature occurred with
pain and tenderness and swelling in the region of the appendix. During the last
three months she suffered continual pain and at the end of this time labor pains
came on. At operation chronic peritonitis, with free fluid, adhesions of the omentum
and small intestines to the fetal sac, were found. The sac was incised and a living
child extracted. A severe hemorrhage followed and the patient's condition became
critical for two weeks. Notwithstanding the sudden death of her father and the
results of an earthquake, which buried her in the ruins of her house, she recovered
and the child lived and was normal except for a slight asymmetry about the head.

CASE 43.—Potocki. (*Bull. med.*, Paris, 1908, xxii, 55.) Primipara, age twenty-
three. Her pregnancy was marked by recurring seizures of pain and expulsion of
blood and membranous debris. Operation was followed by profuse hemorrhage.
The fetus, placenta and tube were removed. The fetal membranes were adherent

only to the intestines. The patient had an uneventful recovery. The child lived but was microcephalic. It developed normally for six months, then had convulsions, strabismus and paralysis of the lower limbs. The convulsions continued for two years leaving the child deaf and idiotic. The child died at four years from convulsions.

CASE 44.—Blesh and Reed, 1908. (*Jour. Am. Med. Assn.*, June 27, 1908, 1, 2137.) Mulatto, age twenty-four. One normal delivery three years before. Early symptoms were those of paroxysmal pain. At operation the child's head was found presenting in the pelvis behind the uterus. The sac containing the child was easily separated from the peritoneum. The child was delivered but was not easily resuscitated. No attempt was made to detach the placenta which was firmly attached to the mesentery of the small intestines. Eight weeks later it was removed without hemorrhage. The mother and child are both well.

CASE 45.—Tissier, 1908. (*Bull. med.*, 1908, xxii, 600.) Patient aged forty-four years. Diagnosis of fibroma was made, and later cesarean section at term was performed. The uterus was found greatly hypertrophied. It was incised but found empty. The intra-ligamentary cyst was found at the right and behind the uterus, with multiple adhesions to the intestines and to the pelvis. A subtotal hysterectomy was necessary to complete delivery but a living child was finally extracted from the cyst. A normal recovery followed. The child's skull was considerably flattened and had not changed three weeks after birth.

CASE 46.—Kirchner, W. (*Am. Jour. Obst.*, 1909, lx, 855.) A colored patient, age thirty, who had had eight previous pregnancies. The early symptoms were those of pain and hemorrhage. Later there was prolapse of the uterus requiring replacement by a physician. A second prolapse occurred but replacement was accomplished by the patient herself. Near term labor pains came on and lasted for two days. Then again twelve days later after a pronounced edema of the cervix, associated with prolapse of the uterus again, the patient entered a hospital and was operated upon. A large cystic and tumor-like mass was found in the lower ⅔ of the abdominal cavity, to which were adhering numerous omental and intestinal structures. The mass was partly delivered through the incision and opened. A profuse hemorrhage occurred but the fetus was successfully delivered and easily resuscitated. The sac was attached in the right side near the ovary and was adherent to the appendix. The appendix and left tube were removed. The child was normal. The mother developed a local peritonitis and endometritis, but recovered after a protracted convalescence.

CASE 47.—Bonifield, C. S., 1910. (*Cincinnati Lancet Clinic*, July 16, 1910.) Age thirty, sterile for ten years, began to have severe pains at 6 months. Mass filled pelvis. At term abdomen opened after labor pains began. Fruit sac and uterus removed after ligating ovarian and uterine arteries. Living, poorly nourished child extracted. Abdomen closed without drainage. Sac included unruptured tube with top of head at frimbriated extremity, causing depression in the skull.

CASE 48.—Savage, T. C., 1910. (*Proc. Roy. Soc. Med.*, lii, 1911-12, Sect. *Obst. and Gyn.*, p. 72.) Primipara, aged twenty-seven. At operation the lower part of the uterus was slightly enlarged and behind the cervix pushing into the posterior fornix was the fetal mass, covered by omentum and in part by the uterus. The placenta was in front partly covered by omentum. The child and part of the placenta were delivered and recovery was fairly rapid. The baby had a slight torticollis, a moderate talipes equinovarus. Nine months later both mother and child were in good condition.

CASE 49.—Bocquel, 1912. (*Arch. mens. obst. et gyn. d'Angers*, Nov., 1912, xi, 272.) The patient was thirty-two years of age. Her symptoms were diagnosed as crises of pain due to appendicitis and renal colic. At operation the placenta was found adherent to the left tube, uterus and culdesac of Douglas, also in a secondary way to the omentum. The sac was removed entire and extensive ligation was necessary to control bleeding. The mother recovered and the child lived.

CASE 50.—Horsley, T. S., 1912. (*Surg., Gynec. and Obst.*, 1912, xxv, 170.) The patient was colored and twenty-seven years of age. She had had one miscarriage at four months and one full term fetus which was born dead. There was slight bleeding in the early part of her pregnancy. At operation the fetus was found floating among the intestines and was covered by a thin membrane which also surrounded the placenta. The child was delivered safely and the mother recovered in forty days.

CASE 51.—Cragin, E. B., 1914. (*Am. Jour. Obst.*, 1914, lxx, 1019.) The patient was a colored woman who thought she was normally pregnant. After the uterus was found empty operation was decided upon. The fetal sac was found attached to the left tube and posterior surface of the uterus. It was surrounded by adherent omentum and coils of intestines. The sac, placenta, left tube and baby were removed. The recovery was stormy and the baby was deformed by a flattened head and deviated feet. The child's progress was steady.

CASE 52.—Essen, K. H.; 1914. (*Therap. d. Gegenw.*, 1914, lv, 360.) The patient was a primipara, aged thirty, whose early symptoms were abdominal pain and hemorrhage. After a period of false labor, operation was performed and the fetal sac containing the child was found among the intestines. The child was not deformed and appeared fully developed but it was not easily resuscitated. The mother and child were normal twenty-seven days after operation.

CASE 53.—Demelin and Devraigne, 1917. (From Delcamp: *Grossesse Ectopique*, p. 48.) The patient was a para ii, whose early symptoms were pain and hemorrhage. At six months the cervix was enlarged and it was decided to amputate; but on account of the expulsion of a piece of tissue and the recognition of a living child a cesarean section was decided upon when the period was completed. Later labor pains came on and operation was performed. The sac wall was found to be very thin and it soon ruptured. The membranes adhered to the abdominal wall in front with the intestine intervening. The child was removed and an attempt was made to loosen the placenta but on account of hemorrhage the tube and placenta had to be removed together with the membranous adhesions. The mother recovered and the child, though compressed on one side of the face has since progressed well.

CASE 54.—Demelin and Devraigne; 1919. (From Delcamp; *Grossesse Ectopique*, p. 48.) The patient's last menstrual flow was 286 days previous. The early symptoms were abdominal pain. On admission to the hospital at the conclusion of her term, pain was so severe as to demand immediate operation. The pulse was 134 and the temperature 36.8° C., the respirations were 32 and the skin was pale and clammy. The child was found free in the abdominal cavity among the intestines. The peritoneal cavity contained meconium and amniotic fluid. The child's trunk was surrounded by a broad ligament. The child was removed but responded only after prolonged resuscitation. The placenta was inclosed within a fibrous sac which was easily removed. The mother recovered and the child is healthy and well.

CASE 55.—Gilliatt, W.; 1919. (*Proc. Roy. Soc. Med., London*, 1919, 12, Sect. O. & G. 177.) The patient was at full term when admitted to the hospital and had been in labor for seven hours. The fetal mass was impacted in the left iliac

fossa and the uterus was displaced to the right and upwards. A living child was delivered by cesarean section.

CASE 56.—Stubbe, H.; 1920. (Med. Jour. Australia, Dec. 25, 1920, ii, 570.) The patient was a primipara, aged nineteen years, who was delivered of a full term extrauterine gestation.

CASE 57.—Newell, H.; 1920. (Jour. Missouri Med. Assn., Sept., 1920, xvii, 35.) This author reports having personal knowledge of two extrauterine pregnancies at full term which have not thus far been reported. In each of these cases living fetuses were delivered. The mothers both recovered. This author describes only one of these cases, which was a gravid one without any untoward symptoms until the time of delivery when the patient complained of abdominal pain of intermittent character. The operation was performed by Dr. Henry Schwarz. Many adhesions were found. The placenta was punctured with a needle and profuse bleeding resulted. The sac was opened and a living fetus was delivered. The placenta was removed in two pieces leaving the sac behind. The patient bled profusely and became pulseless and went into deep shock. The patient, however, recovered and was able to leave the hospital in twenty-five days. The baby and mother both did well.

CASE 58.—Moore, E. C. (Surg., Gynec., and Obst., July, 1921, xxxiii, 65.) This author reports four cases, one operated by Dorman in 1917. The uterus was the size of a three months' pregnancy and contained four fibroids. The pregnancy was in a sac connected with the right broad ligament. The baby lived and the mother recovered.

CASE 59.—The second case was operated on by the same surgeon, Dorman, in 1917. This pregnancy was intraligamentous, the attachment being to the left broad ligament. The mother recovered and the baby when last reported upon was in excellent health.

CASE 60.—The third case was operated upon by DuBose and reported by Lee. (Surg., Gynec., and Obst., 1917, xxiv, 317). This case was a colored woman, thirty-five years of age, who had given birth to an apparently full term child. The first child was delivered by a midwife. The second child was found to be an abdominal pregnancy and the patient was operated upon the following day after the delivery of the first child. A large right ovarian amniotic sac was found with a pedicle attached to the right broad ligament. The entire sac and placenta were removed. The extrauterine child weighed 2 oz. more than the intrauterine child. The convalescence was uneventful and the mother and both children were normal 22 months later.

CASE 61.—Author's case. The patient was twenty-nine years of age, and a primipara. At operation the omentum and small intestines were found adherent to the anterior abdominal wall, and this showed a recent inflammation. The mass had the appearance of a twisted pedicle cyst. The cord from the placenta extended to the left up under the spleen where the child was found free among the intestines and not surrounded by any sac. The intestines on the right side were more or less adherent to one another. The broad ligament and the placenta were removed en masse. The mother recovered and the child lived.

CASE 62.—Rozar, A. R., 1921. (Jour. Am. Med. Assn., Jan. 22, 1921, lxxvi, 239.) The patient was a colored woman, age 35. Her early symptoms were vomiting, abdominal pain and blearing vision. At operation the uterus was found to be the size of a three months' pregnancy and was in front with the pregnancy behind.

The placenta was attached to the posterior surface of the uterus, the right broad ligament and intestine. The child could be seen distinctly through the amniotic membranes, and its movements could be observed. The child was safely delivered. The attachment of the placenta was easily separated, excepting from the intestines where it was more difficult. Hemorrhage was normal. The patient recovered and the baby lived.

CASE 63.—Zarate, E.; 1922. (*Semana medica é Buenos Aires*.)
The patient's symptoms during the first few weeks were diffuse abdominal pains. At operation the child was found deformed, with an abnormally short neck and large face, and the right leg was short. The placenta and sac were attached in one mass with a part of the right tube and ovary. Hemorrhage was slight. The mother recovered and the child was reported as doing well at six months.

493 DELAWARE AVENUE.   (*For discussion see p. 659.*)

THE DEFENSELESS AREAS OF THE ABDOMEN*

BY GEORGE W. CRILE, M.D., CLEVELAND, OHIO

IN the evolution of man and animals defense mechanisms were developed only in those parts which were frequently subjected to injury. Therefore, in deeply protected tissues and in those whose injury inevitably causes death, infection works its way painlessly and relentlessly, undeterred by local resistance. This is true of all the deep seated areas, which have no direct connection with the outside world. Thus below the surface of the abdomen, the power of resistance to infection diminishes in direct relation to the depth of the tissue below the surface. The great vascular trunks which lie deep within the abdomen show little resistance to infection, although these same vessels, when in their course they emerge to more exposed positions, do react to infection by swelling, pain and the other symptoms which are common in inflammation of frequently infected tissues. Thus, an abscess may progress unheralded within the unprotected regions of the abdomen,—in the subphrenic area, in the large retroperitoneal space, within the liver itself. The lack of response in these areas is in marked contrast to the immediate violent defense which is manifested in the protected abdominal regions.

An acute perforating appendicitis, an acute salpingitis, a ruptured gastric ulcer, a perforating wound of the intestine—all intraperitoneal infections are promptly manifested by tenderness, pain, nausea and vomiting, distention, rapid pulse, mounting temperature. On the other hand an infection behind the peritoneum, within the liver, or within the large abdominal veins occasions little or no nausea or vomiting, little or no tenderness, but little pain, and a comparatively slight change in pulse and temperature.

---

*Read at the Thirty-fifth Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Albany, N. Y., September 19-21, 1922.

In the infections of the free peritoneum, the struggle is fierce, dramatic and boisterous; the decision is prompt. In a retroperitoneal infection the struggle is mild, the decision tardy. A subphrenic abscess is shy and concealed; an acute appendiceal abscess is bold and obvious. Contamination of the peritoneum progresses by bounds to infection; contamination of the retroperitoneal area progresses but slowly to infection.

In a general way it may be said that the defense of the tissues of the abdomen varies from almost 100 per cent in the mucosa of the intestine, where the defence is so perfect, that although it is constantly contaminated, the contamination rarely progresses to infection, to almost 0 per cent in the retroperitoneal area, where contamination slowly, but insidiously and progressively, goes on to infection. Between these two extremes lies the peritoneum, contamination of which rapidly progresses to infection, but as rapidly calls into action the mechanism of defense.

The adequate defense of any tissue against infection demands (1) an adequate nerve supply; and (2) an abundant supply of blood.

(1) *Efficiency of the Defense of a Tissue in Relation to Its Nerve Supply.*—Not only is there an abundant supply of nerve endings in a well-defended area, but there appears to be also a qualitative difference between the nerves of well defended and of poorly defended regions. The nerves of the well defended regions act as chemical ceptors, carrying to the nerve centers and the brain stimuli from the presence of toxic agents, just as in their function as contact ceptors they convey the stimuli of physical contacts. The nerves of the poorly defended areas on the other hand, are not only few in number, but give comparatively tardy response to chemical stimulation.

(2) *Efficiency of the Defense of a Tissue in Relation to Its Blood Supply.*—Together with the abundant nerve supply of a well-protected tissue, we find an abundant supply of capillaries. The difference between the blood supply of a well defended and of a poorly defended tissue is dramatically displayed when an incision is made in each. An incision in the former, the intestinal wall, for example, is followed at once by a lively oozing of arterial blood from every part of the incision; an incision in retroperitoneal tissues, on the other hand, is followed by but slight bleeding. Even within the liver, the sluggish oozing which follows an incision is of dark venous, rather than of bright arterial blood. Well defended tissues, such as the walls of the intestines, are brightly colored by the rich supply of blood, while poorly defended tissues in general are pale rather than florid in appearance.

The important coexistence of the rich nerve supply in well defended regions with the rich blood supply lies in the fact that the production of the chemical factors in the defense against contamination and infection is initiated by the nerve receptors; their rapid transportation

and their distribution in the area of danger depends upon the blood supply. The efficiency of defense depends alike upon the number and alertness of the sentinels and the mobilization and distribution of the forces.

The comprehension of these essential distinctions between the well defended and the poorly defended areas of the abdomen leads to the formulation of certain fundamental principles, the observance of which diminishes the hazard not only of surgical procedures actually within the comparatively defenseless areas, but also of the extension of contamination or infection from adjacent areas.

These fundamental principles may be stated briefly as (1) avoidance of contamination; (2) avoidance of anemia and promotion of blood supply; (3) the two stage operation.

(1) *Avoidance of Contamination.*—As has been stated above, in the defenseless areas, while contamination proceeds but slowly to infection, nevertheless, because of the lack of the local defense, the progress of events is practically inexorable.

One of the most poorly defended regions of the body is the subphrenic area, the narrow confined space between the dome of the liver and the diaphragm. It is vitally important, therefore in operations upon structures in that vicinity—upon the gall bladder or the liver in particular, that the entrance of fluids into that region be rigidly prevented. This is of as great importance as the prevention of the entrance of bacteria into the equally unprotected mediastinum. Drainage and Fowler's position avail little after contamination has once entered the subphrenic area as it is practically sealed from below. Moreover, there is little or no protective exudation from the subphrenic area to protect the organism from the absorption of septic fluids, in contrast to the abundant exudate which limits absorption of the septic products of intestinal or peritoneal infection.

In gall bladder operations, therefore, the best drainage is always dependent on drainage, so placed as to avoid any possibility of an accumulation of fluid that can be dispersed by the respiratory movements. In two-stage operations for acute cholecystitis, especial care should be exercised in surrounding the drainage tube inserted at the preliminary operation with a sufficient packing of iodoform gauze to prevent back seepage of the septic fluids.

In operations upon the large intestine, contamination of the lower retroperitoneal areas is prevented by the complete diversion of the fecal stream from the field of resection by means of a colostomy or visceral anastomosis.

In certain gynecologic conditions there is danger of invasion of the retroperitoneal space. Infection following a normal delivery may enter this undefended area, its presence there being unsuspected until

attention is arrested by a systemic condition which suggests the unsuspected invasion.

In any acute abdominal infection, the danger of extension into the retroperitoneal area is lessened by strict avoidance of opening this space and the establishment of drainage at the lowest possible point.

(2) *Avoidance of Anemia and Promotion of Blood Supply.*—The blood supply of any tissue may be diminished or prevented by mechanical means, such as the application of clamps or ligatures; by devitalization of the part by trauma; by cold. It follows that the already lowered resistance of a poorly defended tissue may be reduced still more by the production of local anemia by any cause; by local injury; or by local cooling. These facts lead to obvious measures in the protection of the areas we are considering. Trauma of operation must be reduced to a minimum. In a reduced patient the transfusion of blood, and if there is any myocardial weakness, augmentation of the heart action by digitalis will aid here as it does elsewhere. In any case in which invasion of the retroperitoneal space is threatened the local blood supply may be augmented by the application of moist hot packs, large enough to cover the entire region. This procedure will dilate the comparatively meager supply of capillaries and augment the circulation of arterial blood throughout the area and the heat itself will increase the chemical defense.

(3) *Two-Stage Operation.*—When a contemplated surgical operation involves the defenseless areas, such as operations on the large intestine, division of the operation into two stages promotes the conservation of the weak defenses in part by local reaction, in part by the promotion of the general welfare of the patient. This is an added argument in favor of the multiple stage operation in these cases.

Our widest experience in the untoward possibilities of invasion of the retroperitoneal space or of its direct injury was secured in the war, when penetrating abdominal wounds and direct invasion of the deep abdominal regions were daily encountered. These were the injuries which taxed the resources of the military surgeon to the utmost and the fight of the already depleted organism against the insidious progress of infection in these defenseless areas was almost more hopeless than the fighting in the trenches when the adverse odds were the greatest.

In that experience as in civilian surgery it became obvious that all the methods which conserve and increase the resistance of the patient as a whole were the best means whereby to promote the resistance of the poorly defended areas. Transfusion, maintenance of an adequate supply of water, sleep and rest, the two-stage operation, nitrous oxide analgesia, local anesthesia, minimum trauma, as well as the especial procedures mentioned above—posture, prevention of contamination, warmth—all aid in the protection of the poorly defended areas.

The application of these methods in the surgery of war made it practically possible to save every man whose wounds were not anatomically beyond repair, provided he reached the hospital before the final stages of exhaustion had been reached. In civilian surgery we have been able by these methods to reduce continuously the mortality and morbidity in the types of operations we have been considering.

In our last 393 operations upon the gall bladder and large intestine, the mortality rate has been 2.3 per cent. This number includes 114 operations on the large intestine, of which 43 were radical operations; in this series there have been three deaths.

SURGICAL STRATEGY AS AN ADJUNCT TO LOCAL ANESTHESIA IN ABDOMINAL SURGERY*

By Robert Emmett Farr, M.D., Minneapolis, Minn.

GOING over the literature one is struck with the marked contrast in the reports of the different observers concerning intraperitoneal pain sense. I believe that much of the difference of opinion is due to the fact that the findings are far from constant in different individuals and vary even under similar conditions and greatly under a variety of conditions. The various forms of peritonitis and the general condition of the patient influences findings. It is generally taught that the parietal peritoneum is sensitive and that the viscera are devoid of pain sense in the absence of traction upon the mesentery. My observation shows that this is not entirely true. Traction upon the intestines even without traction upon the mesentery may cause pain; heat applied to the exposed intestine will produce cramps, which are described as gas pains.

I have had a young man of excellent poise and intelligence state that the introduction of the needle through the wall of his intestine was painful, and a careful test showed that he could feel the needle pass through his intestinal wall even though his eyes were covered and an effort made to deceive him. Traction upon the mesentery was here carefully excluded. The parietal peritoneum in the absence of inflammation is insensitive to light touch or even to scratching. However, pinching and traction are disagreeable. In disease this structure is sensitive even to light pressure. This is especially true of certain areas as, for instance, the culdesac. The results of observation will also vary with the manner in which experiments are made. A brisk, quick action will cause complaint when the same act stealthily performed may be readily tolerated. One observer states that the meso-

appendix may be clamped without pain and backs up his opinion by observations upon a series of fifty cases, while another finds that this structure is always sensitive, especially in acute appendicitis. The facts are that the sharp application of a hemostat to the mesoappendix will elicit a complaint from the conscious patient who has not had preliminary medication, unless cocain has been used. (Some authors state that cocain acts as a general analgesic but I have had no experience with it.) However, if one slowly and carefully applies the clamps the patient may not remonstrate. Many factors must be considered in making this simple observation. Whereas, as a rule, the patient who is undergoing an operation under local anesthesia is ready to complain at the slightest opportunity, and may even complain when not being hurt with the hope possibly of making the surgeon more cautious, we must not forget that he may have been compelled to suffer so much during the procedure of delivering the appendix that by comparison the clamping of the mesoappendix may not bring forth a complaint. In no other manner can an observation of this kind, which is so at variance with my own experience, be explained.

Thus, I have frequently found that a strong clamp may be placed upon the mesoappendix, provided it is forced down very slowly, with only slight complaint on the part of the patient. It is known that the base of the appendix may be clamped with no pain sense after the mesoappendix has been blocked or divided. The ovarian pedicle, the cystic duct, and even the fundus of the uterus are tender and cannot be attacked without causing pain, although the latter may be found to be almost insensitive in some cases. The large vessels in the mesentery are sensitive and even those in the omentum, if clamped close to their origin, may show pain sense. There is, therefore, an opportunity to perform operations upon most of the pelvic viscera when the above areas mentioned can be blocked before the operative procedure is begun. Pathologic conditions which cannot be handled without traction upon the mesentery, mesoappendix or posterior abdominal wall may not lend themselves to this form of anesthesia. Here, again, however, we have a good illustration of the difference between careful and rough handling of the tissues. A perfect exposure with a perfect negative pressure may and often does give one the opportunity to see the retaining bands which anchor the tissues to the posterior abdominal wall with the aid of only slight traction while the bands are cut with knife or scissors and the parts liberated. A good exposure will give one the opportunity of reinforcing the anesthesia. When the necessity for traction can be anticipated the tissues upon which the traction is to be made should be blocked at their points of origin from the abdominal wall. We have in a number of instances removed adherent pus tubes by following this plan. Masses which appear to be very adherent and resistant will be found to shell out easily at

times after cutting the "key" bands under direct vision. The important point is to locate the lines of cleavage with as slight an amount of traction as possible and to clip the retaining bands as they appear.

Our experience does not coincide *in toto* with that of Professor Braun, and others, who believe that abdominal surgery can be carried out only upon individuals in whom complete relaxation of the abdominal wall is obtained, although this factor is of great importance.

One of the most surprising of our experiences was the realization of the extent to which abdominal explorations might be carried out under simple infiltration of the abdominal wall with its resultant relaxation of the parietes, combined with vertical retracting, negative intraabdominal pressure and the utilization of the force of gravity which may be obtained by tilting the operating table.

For exploration of the upper abdomen, and operations in this region, we employ the reversed Trendelenburg position. The lateral aspects of the abdomen are best exposed by tilting to the right or left as the case may be. It is not uncommon when complete relaxation is obtained to find that the force of gravity carries all the small intestines into the lateral half of the abdomen. This gives one a most excellent opportunity to apply anterior splanchnic anesthesia in the mesentery or in the retroperitoneal space.

We have almost without exception carried out all of our intestinal resections, even those of the large bowel, under this technic. We would advocate tilting in the performance of surgery in the upper or lateral aspects of the abdomen and believe that it has as great advantages as has the Trendelenburg position, which is its analogue when doing pelvic surgery.

RETRACTION

In abdominal work good exposure is a *sine qua non* to success. It is to be hoped that the day of finger retraction is soon to pass. It is incompatible with asepsis and the desired result can be much more easily attained by the use of proper retractors which will take up less room and, as a rule do the work much more satisfactorily. Harsh retraction will produce much the same effect as inefficient anesthesia. I have known of instances in which an otherwise ideal local anesthesia was converted into a failure, and general anesthesia found necessary because a careless assistant allowed the abdominal wall to slip from a retractor, thus causing a contraction of the abdominal muscles and an expulsive effort, resulting in the extrusion of a large mass of intestinal coils. The most important point about retraction, when working under local anesthesia, is that it be steady; that is, continuous and not intermittent or jerky. "Stealthy" is the word which best describes the manner of doing our work most satisfactorily under local anesthesia. Retraction should be symmetrical, if possible; that is,

equal on the opposite sides of the wound, especially if continued for a long time. Forceful retraction, if made slowly, carefully and methodically, is not usually objected to.

DIRECTION, SITE, AND CHOICE OF INCISIONS

While local anesthesia does not contraindicate the use of any particular incision its use demands an adequate exposure of the pathology present and when operating under its influence great advantages may be gained from a proper selection of the abdominal incision. In our experience the transverse or "L" incision has given the most excellent exposure when working in the upper abdomen and we have used it almost exclusively since 1910. With proper equipment one may anesthetize and enlarge any abdominal incision at the rate of about one inch per minute. Therefore, we do not hesitate to enlarge our incision in any direction when unexpected pathology is encountered, or when other conditions arise which make this procedure seem advisable. The realization of the ease with which this may be done effectually eliminates the necessity for making the original infiltration far beyond the limits of the regular incision and meets criticism that other pathology cannot be reached.

When making abdominal incisions it is desirable in many instances to avoid pressure upon the underlying structures. Acute cases, nervous people or children demand that the abdominal wall be lifted while incising. The skin may be grasped with towel pins and after its division and the nicking of the fascia this structure may also be elevated. Likewise the peritoneum may be gently retracted and when opened the abdominal wall may be elevated by placing a retractor beneath its surface. This demands the careful anesthetization of the peritoneum to a point some distance away from the incision. We do not hesitate to reinforce the anesthesia by introducing the needle subperitoneally after the abdomen is opened for the purpose of injecting the solution.

MUSCULAR RELAXATION. THE PSYCHOANESTHETIST

While the abdomen is being opened much may be done to bring about the ideal condition of complete muscular relaxation which is so essential for successful intraabdominal surgery. An adjunct of vital importance is the "psychoanesthetist" who sits at the patient's head during the operation, looks after his comfort and records the blood pressure, pulse, and respiration. Tactful cooperation on the part of this individual will be found of great assistance. In addition to her other duties her efforts should be directed especially towards aiding in securing relaxation. This individual should be well trained in the administration of general anesthesia and, therefore, prepared to change to mixed anesthesia should this seem advisable.

Again I wish to state emphatically that complete muscular relaxation must always be the goal toward which we should strive if we are to attain the greatest success in this work. The tension which is always present when a patient winces and struggles under the manipulation of the surgeon prevents the complete abdominal relaxation so necessary for the proper performance of any abdominal operation. The surgeon must realize when attempting laparotomies under local anesthesia, that success can be obtained only by the use of a technic which permits of relaxation. The author contends that such relaxation may be obtained in most cases, and perhaps in all, provided one's technic is sufficiently good. For those who are not able to obtain this relaxation in a reasonable percentage of cases, abdominal surgery under local anesthesia will continue to be a herculean task and as a consequence they will quite probably continue to condemn the method in the future as they have in the past. It is hoped that a more universal realization of the facts will change the attitude of that large percentage of surgeons who maintain that only certain classes of cases should be operated under local anesthesia and will convince them that almost all classes of cases can be operated upon successfully by this method and that this is being done daily by those who are accomplished in this art.

As a rule, when the abdomen of an apprehensive patient is uncovered upon the operating table, the tension under which he is laboring will be plainly manifest. The abdominal muscles, instead of being relaxed, will be tense and rigid and the normal depressions which show when a patient is at rest will be absent. This is most plainly seen when the Trendelenburg position is assumed. Here the relaxed individual will present a depression in both iliac fossae. The pubes and anterior superior spines will be prominent and the upper abdomen will bulge forward, as it will contain most of the viscera. In the tense patient this condition does not obtain. The recti are contracted and stand out as ridges on either side of the midline. Contraction of the lateral groups obliterates the depressions normally found below the navel and it is evident that the viscera have not gravitated to the more dependent portions of the abdomen. Now, unless this condition can be overcome by the introduction of the anesthetic with the aid of suggestions and instructions from the psychoanesthetist, who coaches the patient in regard to his manner of breathing and the avoidance of straining, grunting, coughing, or laughing, general anesthesia had better be administered before the peritoneum is finally opened. Few operations can be performed without complete anesthesia. Certainly under such conditions none can be performed painlessly, and a painful operation is neither fair to the patient nor to the method and should not be performed.

THE EXAMINATION OF THE ABDOMINAL ORGANS

The comparative ease with which the abdominal organs may be examined under conditions of complete relaxation, as contrasted with the difficulty encountered in making such an examination under the conditions usually seen when watching abdominal operations, may be brought out by the illustration of the inspection of a herd of live stock under varying conditions. Under ideal conditions we would open the barnyard gate and look over a herd of live stock eating peacefully within the enclosure. The condition of each would be noted, even though an occasional one might need to be turned around in order to obtain a better view. If, on the other hand, when the gate is opened the whole herd, or a goodly portion of it, rushes headlong into the gateway and must be forcibly restrained the inspection cannot be detailed or satisfactory. This comparison, though a homely one, is nevertheless not greatly overdrawn.

The superiority of visual over digital examination I have discussed elsewhere and nowhere does it apply more aptly than in abdominal surgery. Though much valuable information may be gained by palpation, inspection is and will always remain the great purveyor of the facts concerning the actual conditions present. Unfortunately, there is a class of cases in which a negative intraabdominal pressure cannot be obtained, regardless of the form of anesthesia used, and here we must depend to a large extent upon other senses than that of sight. A discussion of the mode of procedure in case a proper exposition of the internal organs cannot be brought about might be worth while.

One has at his command immediate resort to general anesthesia, or the use of some form of surgical strategy, in order to meet the demands. During recent years we have not hesitated to allow more or less evisceration in order to obtain exposure in certain cases. For instance, in the performance of an intraabdominal rectopexy, combined with the removal of a fairly large subperitoneal uterine fibroma, in an individual who was afflicted with marked ptosis and a greatly deformed spine, we found all of the abdominal viscera present in the pelvis when the abdomen was opened. In this case there was practically no space in the upper abdomen for the viscera. Warm, moist sponges were laid upon the abdomen, the whole mass of intestines, stomach, and a portion of the liver were allowed to protrude without restraint. They were then carefully protected by moist, warm pads while the pelvic operations were completed. With ample incision and the avoidance of traction one may follow this procedure with considerable success. This strategy may also be necessitated by the inadvertent evisceration of the abdominal contents due to vomiting, sneezing, coughing, or laughing, or in children, by crying. In a certain percentage of cases of this variety we have met

the emergency by the adoption of the above plan and avoided the necessity of giving general anesthesia.

VISCEROPARIETAL ADHESIONS

Visceroparietal adhesions are usually considered somewhat difficult to handle under the use of local anesthesia, and indeed are usually considered sufficient to contraindicate its use. Nothing could be further from the facts if we are to take our own experience as a criterion.

The adhesive bands themselves are without sensation, and provided the abdomen is opened without pain, with perfect relaxation under a negative intraabdominal pressure, and its wall lifted vertically as the peritoneum is opened the adhesions will be visualized exactly as at autopsy, and may be cut upon the "white line" where they join the parietal peritoneum. As traction upon the parietal peritoneum causes pain the vertical retraction of the abdominal wall should be carefully graduated. The weight of the piece of intestine or other viscus which may be suspended from the abdominal wall may be sufficient to cause the patient discomfort. However, if one lifts the abdominal wall to a slight degree only the adhesions may be visualized and the anesthetic introduced into the properitoneal fat by introducing the needle through the abdominal wall or from the peritoneal side.

Viscerovisceral adhesions may be divided without the use of intraperitoneal anesthesia. The only requisite is the avoidance of traction upon the posterior parietal peritoneum, and even this structure tolerates sufficient traction to allow one to identify the retaining bands, which may then be divided with a knife or scissors.

In conclusion let me reiterate that exposure and the absence of expulsive effort are the prime essentials in meeting the surgical demands in this class of cases. The abolition of the abdominal reflexes, vertical retraction, tilting of the table, combined with a negative intraabdominal pressure, the cooperation of the patient which is best obtained by solicitous care of this individual from the time he presents himself for treatment, combined with the utilization of the skill and tact of a well trained psychoanesthetist will make it possible to perform with satisfaction a large percentage of abdominal surgery under local anesthesia.

Attention to these details, as above enumerated, we have chosen to designate surgical strategy.

2433 BRYANT AVENUE SOUTH.

PRIMARY STERILITY*

By A. J. Rongy, M.D., F.A.C.S., New York, N. Y.

THE subject of sterility in women has greatly absorbed the interests of investigators and clinicians in recent years. The numerous contributions to the subject are to me an indication that our present knowledge of the subject is incomplete, that the methods heretofore employed in the treatment of sterility have failed to accomplish the desired results, and that we are still groping in the dark as to the true etiology of primary sterility in most cases.

During the past two years I carefully followed the more important publications on the subject and I believe that I have a fair knowledge as to what has been written concerning all the phases of sterility. Keen interest is displayed everywhere to find something which will help to cure that group of our patients, who consider themselves the most "cursed" members of society.

There are at present two definite groups of investigators: First, those who concern themselves with the male aspect of sterility as it relates to the virility of the spermatozoa. Careful studies have been made of the spermatozoa, as to their mode of travel to the interior of the uterus and the length of time they survive there, and the effects of the cervical and vaginal secretions upon their motility and viability.

These investigations are interesting from an academic standpoint but clinically they did not help us very much in our treatment of sterility. It was thought at one time that if spermatozoa were deposited high up in the uterine cavity, they would be in a more fit condition to impregnate. Artificial insemination, therefore, became one of the methods in the treatment of sterility. Occasionally success was reported. However, further experience taught us that this treatment was absolutely ineffective and that not infrequently it proved dangerous, because it spread infection in the genital tract.

The study of the influence of diet upon the development of the spermatozoa seemed for the time being to be very interesting. Observations were made on the effects of diet, restricted as to its quality and limited as to its quantity, upon the development and natural life of the spermatozoa. Subsequent investigations did not confirm some of the earlier observations, and it is now generally conceded that diet has no influence upon the development of the spermatozoa.

I believe that our knowledge of the life history of the spermatozoon in its relation to impregnation and conception is very meagre. Once well-formed spermatozoa are found in the secretion of the male we must assume that he is capable of impregnating a woman, the mate in many instances may not necessarily have to be his wife.

The second group of investigators, or those interested in the female aspect of sterility, have had a more fruitful field for their theories, as to etiology and treatment. In no other branch of medicine were patients subjected to such unreasonable treatment as some women suffering from sterility.

The mechanical theory of sterility still has a strong hold on the profession. The result is that it is but a rare exception to find a woman who is sterile for any length of time who was not dilated and curetted one or more times. I need not point out what such procedures lead to, especially in women who have had a subacute or chronic infection in or about the pelvis. Very often the complications were such that no amount of surgical interference would cure the patient completely.

When surgical procedures in general became less hazardous to the patients simple dilatation was quickly replaced by methods which had for their purpose the permanent enlargement of the cervical canal. Accordingly, stem pessaries and tents of various sizes and shapes were invented and inserted into the cervix, and kept there from two to twelve weeks. It is surprising that even recently articles were published which gave the number of patients who were cured by such treatment.

Evidently the results of these simple procedures in the treatment of sterility did not prove very successful, for many cutting operations upon the cervix were invented. Some chose for their points of attack the posterior lip, others the anterior lip, and still others the lateral walls. More recently, however, operations have been devised which practically necessitate the removal of the greater portion of the cervical tissue, and the cervix, or what is left of it, is reconstructed according to the fancies of the individual operator.

I believe that the time has come when we should recount our experiences and seriously ask ourselves the question, whether these operations have ever cured any of our patients, or are we deluding ourselves by the occasional good result which apparently follows some of these procedures?

My experience may differ from that of many others but I am sure, now more than ever, that operations upon the cervix for the cure of primary sterility are absolutely useless, and that in a great number of cases they do more harm than good. I never saw a cervical canal which was too small for a spermatozoon to pass through. Once the

clotted particles of menstrual blood pass through the cervix the canal is roomy enough for the spermatozoa to travel up into the uterus.

I am convinced that the mechanical theory of sterility is purely a myth, and in practice it does not exist. The fallacy of this theory I was able to demonstrate since we instituted at Lebanon Hospital the routine examination for patency of the fallopian tubes in well selected cases, who suffer from sterility. I found that we succeeded in introducing a No. 6 Holzman cannula into the uterus in 213 patients of a total of 215 that were examined. Who will maintain that obstruction in the uterine canal existed in these patients, or that their sterility was due to some organic mechanical occlusion in the cervix?

During the last decade the study of the functions and secretions of the ductless glands has developed new conceptions of the physiology of the human body. Many mooted points have been clarified by the steady increase of our knowledge of the glands of internal secretion. Our conception of disturbed bodily function has been greatly changed. For a brief period of time it seemed that the entire foundation of the science of medicine would be shattered. The few fundamental principles which took so many years to develop were in danger of being destroyed.

It was at this time that sober reflection and honest effort to seek after the truth fortunately predominated, so that a proper equilibrium was maintained. Unfortunately some strayed afar, and, instead of critically examining the facts presented by the various investigators, were carried away by a wave of so-called "endocrinology." They practically commercialized the meagre knowledge in their possession and exploited it upon a credulous public. The attitude and behavior of some of these gentlemen were such that it almost bordered on divination. They conducted themselves as if they were really inspired by some superhuman power and that the rest were merely ordinary mortals.

It was but natural that such hysterical speculations should soon creep into the domain of gynecology. In this branch of medicine endocrinology became almost a cult. Miraculous cures, secret and otherwise, were held out to suffering womanhood. The woman who suffers from sterility from time immemorial has been an easy prey for all sorts of exploitations. Various combinations of organic extracts were concocted and prescribed for patients with the positive assurance that they would be absolutely cured.

I do not want to appear pessimistic, neither do I wish to offer criticism destructive in character, it is contrary to my natural inclinations. I probably would not draw conclusions about organotherapy were they based upon my own experience only. I might have thought that it was not given to me to understand the delicate and intricate

problems associated with endocrinology. I am prompted to arrive at these conclusions because of the careful observations I made on patients who were treated by some of our foremost self-styled endocrinologic gynecologists. I know that these patients were not cured by them, and that not only did they remain sterile, but also that their menstrual disturbances were not improved for any extended period of time.

During the past five years I used practically every standard preparation of the various organic extracts in hospital and private practice. I was especially interested to learn what effect they had on patients who suffered from primary sterility. I must confess my firm conviction that the organic extracts, as they are at present prepared, play no rôle whatsoever in the treatment of sterility.

During the twelve months preceding September 1 of this year 192 women consulted me for primary sterility. Most of these patients had consulted other specialists before they came to see me. The majority had had some operative interference, either by their family physician or by a specialist. The operations varied; some were dilated, others had one of the cutting operations on the cervix, a few were subjected to abdominal operations in order to correct uterine displacements or to repair diseased fallopian tubes; all of them received various combinations of organic extracts as an adjuvant to the operative measures. The results were equally unfavorable with all the methods of treatment. All but twelve patients never became pregnant, and the probabilities are that they will remain sterile, unless a new therapeutic agent will be discovered which truly will help these patients.

The average age of the patients in this series was twenty-eight and one-half years; the average period of time of marriage was six and one-half years; the shortest period was nine months, the longest seventeen years. Twenty-two per cent of the patients suffered from irregular menstruation, the intervals ranging from two to nine months. One patient stopped at the age of twenty and one-half years; she began to menstruate at sixteen years of age and menstruated very irregularly during that time. One patient began to menstruate at fourteen years of age and stopped at the age of twenty-three years. One patient ceased to menstruate as soon as she married, at the age of twenty-four years. She came to see me three years later.

Fourteen per cent of the patients suffered from dysmenorrhea. Many were compelled to remain in bed during their menstrual flow. Four per cent suffered from scanty menstruation and only spotted or stained for one or two days. One patient suffered from menorrhagia. Eighty-six patients of this series were examined for patency of the fallopian tubes. In 58, or 68.8 per cent, the fallopian tubes

were found to be open. In 27, or 32.2 per cent, the tubes were apparently closed. The percentage of patent fallopian tubes in this series of cases is somewhat higher than in our previous series. This may be accounted for by the fact that we probably have a better understanding of the technic of this procedure.

Transuterine insufflation of the peritoneal cavity with oxygen or carbon-dioxide gas, as developed by Rubin, is a very valuable aid in the diagnosis of sterility. We have no other method of examination which so clearly demonstrates the patency of the fallopian tubes. Once the patency is positively established the patient will no longer be subjected to exploratory operations on the mere suspicion that the tubes might be closed, as was the practice heretofore in a great number of cases.

This method of examination should be utilized in every case in which the cause of sterility is of doubtful origin. It is especially useful in those who have had one fallopian tube removed because of infection or extrauterine pregnancy.

Complications can be avoided if the patients are carefully selected. It should never be used in the presence of acute or subacute infections, or when the patient complains of pain in the pelvic region. We employed this method of examination 215 times during the past twenty months without any untoward complications; two patients developed acute pelvic infections, which subsided under palliative treatment.

The therapeutic value of this procedure must for the present be left in abeyance, although five of the patients did not menstruate after this examination, and subsequently were found to be pregnant. We believe that the entrance of gas into the tubes, under pressure, will expel mucous plugs from them and also straighten out any kinking which might have taken place along their course.

We now utilize transuterine insufflation during abdominal operations. In that way we are able to establish positively the patency of the tubes with the least amount of traumatism to their mucous membranes. We also employ it in patients who have had plastic operations on the fallopian tubes. It can be very readily performed during convalescence of the patient from the operation. The passage of gas under pressure through the tubes may prevent the formation of adhesions around the distal openings, and therefore closure of the tubes is less likely to occur.

A careful study of my patients clearly demonstrates that the percentage of sterile patients who are amenable to treatment is very small. The experienced gynecologist usually has no difficulty in properly interpreting the physical findings of the patient, especially when it is supplemented by a thorough history, the prognosis and

treatment can be established in nearly all the cases with a fair degree of accuracy.

As a general rule, women who suffer from primary sterility can be separated into three distinct groups. Exceptions undoubtedly occur. (1) Patients with congenital defects, which vary in degree from the total absence to the milder forms of malformation of the genital organs. Such women are incomplete physical beings and are beyond the help of all known therapeutic measures. (2) Women who apparently do not have physical defects of the genital organs, but suffer from disturbance of function of these organs. Usually it is shown by the changes which take place in their menstrual cycle. A great number of these patients suffer from dysmenorrhea, and do not have their periods at proper intervals; their flow is lessened or scanty. In these patients the sterility very often is temporary in character. Sooner or later some readjustment takes place and pregnancy ensues.

It is in this class of patients that we often ascribe to the treatment the successful outcome of the case. A great number of these patients would have become pregnant if they had not been treated; some might have required minor corrections as to their mode of sexual life; others would have had to have neutralized a highly acid vaginal secretion; and a few might even have had to change climate. That pregnancy finally takes place in a certain percentage of these cases, when not treated, I proved conclusively in a previous paper. (3) To this group belong all patients who are sterile because of mechanical obstruction of the tubes, which is caused by infection acquired during the marital state, or induced by inflammatory reactions of the genital organs which occurred during an infectious or contagious disease in infancy or childhood. Not infrequently closure of the tubes can be traced to an extension of the process of specific vulvovaginitis in young children.

Fortunately we have now a method by which we can definitely ascertain whether the tubes are open or closed. It is surprising to find the number of young women whose tubes are closed and who have no immediate history of infection of the genital tract.

Plastic operations on the tubes in these patients heretofore did not cure many. Pregnancy ensued in less than 15 per cent; the others remained permanently sterile. Partial resection of one or both tubes will often rob the women of any possible chance for future pregnancy, as the postoperative reaction in the pelvis after such an operation is, not infrequently, very severe and causes great damage to the genital organs.

I am fully aware that a great many will not agree with the views I have presented in this paper. I have made an honest effort to study my patients very carefully and I am stating the experiences from my

own practice and also from patients who have been treated by many of the leading gynecologists of this city.

I am certain that we must discard our present methods of treatment of sterility because they have been erroneously conceived. The sooner we older men in the field of gynecology admit defeat the sooner will the younger generation of specialists wake up to the fact that upon them rests the responsibility of the solution of a problem which will bring salvation to so many ill-fated women.

345 WEST EIGHTY-EIGHTH STREET.

A NEW OBSTETRICAL TABLE

BY EDWARD L. CORNELL, M.D., F.A.C.S., CHICAGO, ILL.

THE obstetrical table originally put out by Dr. W. W. Ely of Rochester, New York, has been extremely convenient in connection with prenatal care. It has occurred to the author that a more complete table would be advisable. He therefore submits the accompanying chart.

The upper row of dates represents either the first day of menstruation or the day upon which life is felt, not both at the same time.

The second row of figures indicates the date of delivery in primiparae computed from the date of quickening.

The third row indicates the date of delivery in multiparae computed from the date of quickening.

The fourth row indicates the date of delivery computed from menstruation.

For example: If the last period was January 1, the delivery date is October 8. If the patient is a primipara and she felt the baby January 1, she will be delivered June 4. If, on the other hand, she is a multipara she will be delivered June 18. The variance is due to the fact that primiparae feel babies two weeks later than multiparae.

OBSTETRICAL TABLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
January	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
June	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	July
June	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	July
October	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	November
February	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
July	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	August
July	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	August
November	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	December
March	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
August	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	September
August	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	September
December	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	January
April	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Sept.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1		October
Sept.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		October
January	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4		February
May	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	November
October	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	November
February	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	March
June	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Nov.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1		December
Nov.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		December
March	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		April
July	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Dec.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	January
Dec.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	January
April	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	May

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Month
August	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
January	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	February
January	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	February
May	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	June
Sept.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
February	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3		March
February	16	17	18	19	20	21	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		March
June	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7		July
October	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
March	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	April
March	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	April
July	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	August
Nov.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
April	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3		May
April	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		May
August	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6		Sept.
Dec.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	June
May	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	June
Sept.	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	October

The top row indicates the date of first day of menstruation and the date life was felt. The next row indicates the date of delivery in primiparae computed from quickening date. The third row the date of delivery in multiparae computed from menstruation. The fourth row indicates the date of delivery computed from menstruation. By row is meant the figures running across the page.

For example: If the last period was January 1st, the delivery date is October 8th. If the patient is a primipara and she felt the baby January 1st, she will be delivered June 4th. If, on the other hand, she is a multipara she will be delivered June 18th.

The variance is due to the fact that primiparae feel babies two weeks later than multiparae.

WHAT CONSTITUTES THE SURGICAL CERVIX?*

An End-result Study of 350 Cervical Operations with Their

Effects on Sterility, Discharge, Pregnancy and Labor

By John Osborn Polak, M.Sc., M.D., F.A.C.S., and
George W. Phelan, A.B., M.D., Brooklyn, N. Y.

IN this day, when the furor for operation has seized both the public and the profession, it is well at times to review one's work, to see whether end-results have justified surgical procedures. No part of the female gentalia has received so much attention in recent years as the cervix uteri. Endless papers and monographs have been written upon the remote effects of the lacerated and infected cervix.

In the city of New York, and in some of the outlying towns, no cervix in a woman of sexual maturity, is exempt from surgical attention. Hence, it has seemed to me, that it might be well to determine what constitutes the surgical cervix and how much pathology must exist before we are justified in subjecting the patient to excision, trachelorrhaphy, tracheloplasty or amputation.

With this purpose in view, I have had the case records of 350 cervix operations reviewed; the indications for the procedures analyzed and the end-results as to the effect on sterility, discharge, pregnancy and labor, tabulated.

A laceration of the cervix is a rent or tear in the cervical tissue of the uterus; some degree of laceration in the cervical rim occurs in nearly all primiparous labors; hence, in the parous woman the external os is widened and exposure of the cervical canal to a greater or less depth is commonly present; yet only about 50 per cent of such lacerations remain as actual clefts in the cervical rim.

Lacerations may take place at any point in the circumference of the cervical rim, they usually occur in one or both lateral aspects; the tear may be into the cervical tissue of the portio without going through the covering portial mucous membrane; or it may sever all of the tissues of the cervical rim at the point of injury. While the majority of these tears are bilateral, the more extensive injury is usually on the left side; and when the rent is unilateral it is commonly found on the left side. These tears may extend through the fornix or into the lateral parametrium, which exposes the cellular tissues surrounding the uterus to infective invasion. Fortunately nearly one-half of all cervical lacerations heal spontaneously. The pathological significance of a tear, is not so much the extent of the tear, as the

---

pathological changes which follow as a result of the incidence of infection caused by invasion of the bacteria from the vagina, and the tissue changes consequent upon the associated subinvolution and the passive hyperemia, for the heavy uterus is always out of the plane of circulatory equilibrium.

When these tears extend beyond the vaginal junction into traumatized devitalized cellular tissue, infection is not uncommon. This results in healing by granulation and allows a mass of scar tissue to develop in the angle. This arrests both cervical and uterine involution and the cervical structures become passively congested, hypertrophied, hard and indurated. The cervical glands which are of a racemose character may also become infected and the lips are rolled outward everting the cervical mucosa, thus exposing it to the continued irritation of vaginal contact. This stimulates the cervical epithelium to rapid proliferation and the cervical mucosa actually pushes itself out upon the vaginal aspect of the cervical rim; thus the torn, everted surfaces present a red, swollen, angry appearance which has been called erosion; *but which is properly a new cell formation resulting from the overgrowth of the lymphoid tissue within the cervical canal.* This hyperemia, passive though it is, increases the activity of the cervical glands; while the tissue hyperplasia in the interglandular structures blocks and occludes the ducts leading from these glands, which normally empty into the cervical canal, and retention cysts, containing glary mucus, result. The angles of the tear become filled with a plug of scar tissue which produces permanent ectropion or rolling out of the cervical lips.

The lymphatic system, draining the cervix, is continuous with that of the lymphatics of the uterus and the parametrium; hence infection of the cervix extends through the cervical lymphatics to those of the uterus, depositing the products of inflammatory reaction between the uterine muscle fibers which become organized and increase the connective tissue content in the uterine wall. This, in turn, interferes with the action of the uterine muscle, in emptying and filling the uterine sinuses, for normally, the uterus is a muscular organ with involuntary contractions, that may well be called "the pelvic heart"; for it propels the blood automatically through its walls and intermuscular spaces. Hence, *any inflammatory deposits which impair this muscular activity* must necessarily leave the organ in a state of passive congestion, this is followed by edema and increased size, or the infection may extend through the lymphatics to the cellular tissue in the broad or uterosacral ligaments and result in a parametritis.

In the foregoing statements, I have shown that actual pathology may result from an infected tear, yet more than half of all cervical

injuries present none of these pathologic changes; *except perhaps a papillary erosion. The so-called erosion is not an indication for surgery, unless this erosion is upon the lips of an everted, hyperplastic. indurated cervix;* for an erosion is truly but an adenomatous overgrowth of the mucous membrane of the cervical canal, which extends beyond the limit of the external os, or out upon the vaginal portion of the cervix. *It is not a raw surface,* as the name would suggest, but an overgrowth of the adenomatous tissue, stimulated by the exposure and irritation of the epithelium lining of the cervical canal.

In the normal cervix, without injury, there is a sharp line of demarcation at the external os, or just within it, between the mucous membrane lining of the cervical canal and that of the portio vaginalis. The mucous membrane of the cervical canal is composed of the usual connective tissue base covered with a single layer of tall columnar cells of the mucous type, with the nuclei deep down toward the base, and the free margin distended with mucous secretion. In the substance of the basal membrane are racemose glands, lined with the same type of epithelium. These glands discharge their tenacious mucus into the cervical canal. The portio, on the other hand, is covered by stratified squamous epithelium in many layers, and contains no glands. At the line around the external os where these two types of epithelium meet, there is a sharp transition; this line of demarcation may be found at different levels in the cervical canal in different individuals. It is commonly, however, at the margin, but occasionally the columnar epithelium may so proliferate as to extend beyond the external os and produce a congenital noninfective erosion.

The commonest cause of erosion is a laceration of the cervix, and this results from (1) childbirth or (2) surgical trauma. When the tear is small and uninfected it heals without pathology; when the tear is deep, and especially if it is bilateral, there is eversion of the divided lips; this exposes the mucous membrane of what was the cervical canal to infection or irritation from the vagina. Infection of acute or subacute form always results in hyperplastic changes, which thicken the substance of the cervix and further roll out the margins. The irritation produced by the friction of the vaginal walls and exposure to the acid vaginal secretion leads to a rapid proliferation of the surface and glandular epithelium; and an adenomatous overgrowth of the lymphoid structures. The mucous membrane becomes *thickened* in cushion-like folds of dark red or purple color. There is a tendency for the cylindrical epithelium to extend beyond the margins of the tear and to replace the squamous epithelium of the vaginal portio normally present. A similar condition may result from gonorrheal infection without any cervical laceration, for the gonococcus excites an inflammatory reaction in the stroma of the mucous

membrane, and this becomes thickened due to edema and inflammatory exudate and the mucous membrane of the cervical canal tends to bulge through and roll out of the external os.

In the chronic stage there is a glandular proliferation and the mucous membrane rolls out beyond the external os. The commonest symptom of erosion therefore is a mucoid or mucopurulent leucorrheal discharge; sometimes stained with blood and increased in quantity especially just before and after the menstrual period.

In this study we have divided the cases into those with (1) erosion and gland infection without loss of tissue; (2) tears with considerable loss of tissue; (3) cervical hypertrophy and hyperplasia with induration; (4) cystic degeneration; (5) deep bilateral tears with erosion and (6) stellate or multiple lacerations.

Trachelectomy or the removal of a part of, or the entire, cervix is demanded when there is hypertrophy (infravaginal or supravaginal), extensive or multiple lacerations, or extensive infection, cystic changes with surrounding hyperplasia, or in connection with prolapse operations in women who have passed the menopause. *Whenever possible trachelectomy should be avoided, during the child-bearing period, as it predisposes to abortion in subsequent pregnancy and dystocia in subsequent labor.* Proper preliminary treatment for several weeks before operation will often so improve the local pathology as to make trachelorrhaphy possible.

Before selecting the forms of treatment to be employed we have always attempted to determine the extent of the pathology and the type of infection which produced that pathology. As we have already stated, *erosion, unless the lips are hypertrophied or hyperplastic, is not an indication for surgery.* The ordinary erosion will usually yield to applications of the actual cautery which destroy the excessive lymphoid growth. This may be done by the linear cauterizations suggested by Russel, and demonstrated by Dickinson, or by the method which we have been using for several years; which consists of using a flat cautery knife upon the erosion destroying the entire circumference of overgrown tissue and having the patient report back in three or four weeks, when a further application is made if the erosion has not been thoroughly destroyed.

It is apparent that chronic infection of the glandular structures which penetrate to a considerable depth cannot be effectively destroyed by this form of application; in these cases we use a more extensive cauterization as the intracervical use of radium, employing 25 mgm. in capsules, in short exposures. The glandular structures seem to be entirely destroyed and scar tissue substituted, yet pregnancy has not been interfered with and labor has not been complicated.

The subject of trachelorrhaphy versus tracheloplasty as suggested by Sturmdorf, is still a live question. Trachelorrhaphy has a definite place in the lacerated, noninfected, nonhypertrophied cervix; and particularly in the postpartum cervix before involution has been completed. On the other hand, when the infection has extended into the glands and pathologic changes have taken place in the interglandular stroma, cystic changes and hyperplasia result. In the presence of such pathology, excision of the cervix with removal of the pericervical glandular tissues without invading the muscle structures to any great extent, is the conservative procedure and may be elected instead of amputation.

Many claim that this is all that is necessary, but we will show in this study that a certain proportion of the cases in which tracheloplasty has been done, are not cured of either their sterility, glandular infection, or the surrounding parametritis, because excision of the mucosa and submucous tissues has not been sufficiently extensive to remove all of the focal infection. It is in this class that trachelectomy or amputation has its widest field; for not only is it indicated here, but it is demanded when there is either excessive infra- or supravaginal hypertrophy, extensive or multiple lacerations with scar tissue, cystic changes with surrounding hyperplasia, chronic glandular infection and in connection with prolapse operation in women with large uteri, who have passed the menopause.

It may be generally stated that whenever possible, trachelectomy should be avoided during the child-bearing period, for clinical observation has shown that it predisposes to abortion in subsequent pregnancy, while tracheloplasty has not the same effect on pregnancy and is not so frequently a cause of premature labor and dystocia during delivery. Tracheloplasty does not, however, eradicate the infection and cure the leucorrhea in a large proportion of cases. As we have gone along in the study of our end results, we have gradually become impressed that it is time to teach the profession anew what the late Thomas Addis Emmett taught his students years ago, namely, that the proper preliminary treatment carried out over a period of weeks before operation is considered, will often so improve the local pathology, rid the cervix of its edema, destroy cysts, and cure the infection as to make trachelorrhaphy possible, when under ordinary circumstances, with no preliminary treatment the cervix would have to be amputated.

It is because of the lack of this preliminary treatment, that many of the cervical operations fail to cure the existing glandular infections and the associated parametritis.

We have found a number of cases in which the leucorrhea, the chief symptom of which the patient complained, has not been re-

lieved. Investigation has shown that this failure was due to faulty union of the mucosa which was brought over the excised tissue. This failure of union was the result of infection, which was latent in the cervical tissues.

This brings us again to the necessity of preoperative treatment of the cervix, before considering the question of operation in all cases of subacute and chronic infection. Such local measures as douches, multiple puncture, destruction of cysts, tissue depletion by the boroglyceride pack and the Bier suction apparatus, diminish the size of the cervix, relieve the edema, reduce the possibility of latent infection and favor healing.

Operation in the presence of any infection is always fraught with danger and may extend the infection into surrounding tissues. Tracheloplasty has cured sterility when this condition was caused by excessive cervical hypertrophy or abnormal cervical discharge.

In our clinic no operation has been employed for the cure of sterility until the presence of live, motile spermatozoa have been demonstrated in the vaginal vault and been shown to be present on the portio and in the cervical canal. Dead spermatozoa in the cervical canal attest the presence of an incompatible cervical discharge.

A certain proportion of these operations, tracheloplasty, and amputation of the cervix, have been followed by pregnancy. These pregnancies have resulted in abortions, premature deliveries and full-time labors.

Abortions.—Has the frequency of abortions been greater than under ordinary circumstances in the normal uterus when no operations have been done? The usual incidence is about 24 per cent.

When it is considered that the majority of these women sought advice for the relief of sterility, it is fair to presume that no effort was made by the patient herself to interrupt the course of gestation. Hence it may be assumed that the abortions recorded in the course of pregnancy following these operative procedures were spontaneous. Many of these cases have had a bloody discharge during the first trimester, showing that there was some ovular unrest. Notwithstanding the incidence of this metrorrhagia, a larger number of these women have carried their pregnancy through to term.

In those patients where amputation was made through the cervix, at a point close to or above the internal os, pregnancy has not occurred; and in several, uterine atrophy and amenorrhea have followed.

Effect on Labor.—Our observations have shown that tracheloplasty and trachelectomy through the portial cervix have one of two effects on labor. Either the labor is more rapid, or more tedious; when the labor is more rapid, it has been noticed that considerable dilatation and effacement of the cervix has occurred and been present several

weeks before the actual occurrence of labor pains. When dystocia has occurred, in looking back over the previous history of the case, we have found that extensive hyperplasia existed prior to the operation. This has resulted in soft-part obstruction at the cervix at the time of delivery, and was manifested either by a rigid, undilatable cervical rim, or an excessively thinned out lower segment with no dilatation of the os, after hours of hard labor. These cases of cervical dystocia have been handled by the vaginal pack, multiple cervical incisions, and in two instances, by cesarean section. Usually, however, section unless it is followed by hysterectomy is inadvisable in these cases of cervical atresia.

Critical study of this series shows that operation on the surgical cervix, i.e., for extensive or multiple lacerations, extensive erosion with hyperplasia or cystic degeneration, even when the type of operation is carefully selected, in a large number of cases does not cure the leucorrhea or sterility, and that unless the operation is preceded by a long period of preliminary local treatment, the leucorrhea is cured in only a little more than 50 per cent of the cases operated. It is therefore urged that all operations on chronically infected cervices be preceded by local treatment.

Only a relatively small number of sterilities are cured by operations on the cervix, and these should only be done for this cause after a Hühner and a Rubin test have shown that the fault is in the biochemical changes in the cervical discharge.

After amputation or excision should pregnancy occur, it is more likely to terminate in abortion than has been the case when trachelorrhaphy has been elected.

Dystocia during labor is also more common after amputation and excision than after cervical repair.

Finally, that critical reviews of one's work are illuminating, and that in order that such reviews may be of practical value, better follow-up systems are necessary.

20 LIVINGSTON STREET.

ELECTROTHERAPY IN GYNECOLOGICAL PRACTICE

By Edward C. Titus, M.D., New York, N. Y.

WHILE the treatment of gynecologic cases has been largely operative, I am convinced that there is a tendency on the part of many conscientious workers in this field to seek for methods by which operation in various conditions often can be avoided or at least greatly restricted.

It is but recently that I received a letter from a gynecologist of prominence in this city who freely admitted to me his absolute disgust with some of his operative results and his inability to relieve many types of cases by any of the therapeutic measures within his knowledge.

Aware of my particular interest in electrotherapy, to which much of my work for many years has been devoted, he inquired as to its possibilities in various gynecologic conditions, such "as retroposed uterus with restricted mobility because of pericervical cellulitis, dysmenorrhea without any palpable reason, and subinvolution of the uterus, as well as other pelvic disorders." In conclusion the doctor expressed the conviction that he should do more office work and resort less to operative treatment.

Coming from so distinguished a gynecologist, I have been encouraged to think that surgeons are awakening to the possibilities of electrotherapy in many diseases of the female generative organs in which the results of the customary operative procedures have left much to be desired.

In this brief paper it will be my aim to point out the value of some of the more common electrical modalities in the treatment of various diseases peculiar to women in which they have proved an efficient substitute for or, at least, an auxiliary to operative measures.

Realizing that comparatively few gynecologists are familiar with many of the more recent investigations as to action of the various electrical currents, I will give a brief description of these and the effects of each—both local and general—and will then endeavor to demonstrate their method of application.

As the uses of diathermy and roentgentherapy in gynecology will be discussed by other members at a subsequent meeting, I will only touch upon them where their application is indicated in combination with the special methods I am bringing to your attention.

The galvanic or direct current is a continuous flow of energy, producing polarity effects by which it causes electrolytic or chemical changes. The latter may be nutritional or even destructive depending

upon the method of application and intensity of the current. When this modality is preceded by local diathermy for twenty minutes, the effects seem to be greatly intensified and followed by more marked beneficial effects on both the objective and subjective symptoms.

The negative pole is employed as the active electrode when we desire to induce a relaxation of all structures at the site of application, promote the absorption of scar tissue, and reestablish drainage.

The negative pole is also employed when we desire to promote the absorption of intra- and extra-uterine exudates by means of iodine ionization. In this way the iodine ions are driven into the tissues by the negative current. The technic is as follows: For intrauterine application, a suitable metal electrode is wrapped with absorbent cotton to a sufficient thickness to admit of its easy introduction through the cervical canal, the proximal end being covered with rubber tissue or tubing to protect the parts from contact with the exposed portion of electrode. The cotton covered end is dipped in a 25 per cent solution of tincture of iodine in water, and is then introduced to the distance required. It is important that the electrode be attached to the negative pole of the machine, for the iodine ions are forced into the tissues by the negative polarity only.

When periuterine conditions are to be treated, an insulated rod electrode with a carbon tip, the size and shape of an olive, is used; the tip is covered with 12 thicknesses of gauze held in place by a small rubber band or string. The gauze is soaked in the above-mentioned solution and the electrode is passed through a speculum to the area to be treated.

When the positive pole is used as the active electrode, we have electrolytic action, changes in the circulation and tissue contraction in the parts acted upon. There is also a depositing of metallic ions within the tissues, the degree depending upon the duration and intensity of application, the ionic motility of the metal employed and its specific effects.

The effect upon the immediate structures of this positive pole application is a process of coagulation and the formation of an oxychloride of the metal used, which is infiltrated in the tissues and causes them to adhere firmly to the electrode. This is strikingly shown by the fact that if an attempt is made to withdraw the electrode it will tear off the adherent coagulated membrane. To obviate this, the current is slowly reduced to zero and the polarity reversed; then the negative current is allowed to flow and gradually increased to the point of comfortable tolerance and until the electrode becomes loosened. The strength of current usually employed is from 5 to 40 M. A., the duration from 10 to 30 minutes, and the frequency, once or twice per week. I have yet to see any untoward results from these procedures, while usually very beneficial effects are observed.

Faradic or Induced Current.—The best results are derived from this current when it is obtained from a high tension coil with the interrupter

adjusted to a slow rate of vibration, comparable to the rate of muscle fibrillation (30 per second), and it is administered under a proper control, in surges of a frequency to correspond to the heart impulses.

This procedure is a particularly serviceable and safe means of treating both local and general muscular weakness, especially in cases where the abdominal walls are greatly relaxed.

The Sinusoidal or Rythmic Wave Current.—This is a slowly swelling, unidirectional, continuous electrical galvanic discharge, which reverses its polarity at the completion of each cycle. It produces alternate contraction and relaxation of both striped and unstriped muscular fibres, and when these effects are regulated to correspond with the frequency of heart action, beneficial nutritional changes in all muscular tissues are greatly promoted. In uterine dysfunction, especially when due to underdevelopment, and in the flaccid conditions of the uterine body associated with leucorrheal discharge, so often met with in young single women, the proper application of this valuable current will give results unequalled by any of the customary procedures. This is accomplished through the elimination of effete material, and the improvement in the intraabdominal pressure, due to the increased tone in the abdominal viscera and muscles of the trunk.

The Static Wave Current.—This current is a pulsatory, high voltage electrical discharge with an initial low amperage. It can also be defined as a capacity discharge obtained from a unidirectional source of energy. Because of its high voltage and low amperage and the wide dispersal of its pulsatory waves, both locally and through the body, the static wave current enables us to produce rapid physical changes in the structures treated.

For the relief of active stasis as in spasmodic dysmenorrhea, and passive stasis as in conditions of subinvolution, this current will be found a most valuable remedy which induces profound, painless, alternate contractions and relaxation (a milking out process) and stimulates vascular drainage throughout the cellular structures at the site of application of the electrode. The insulated vacuum electrode, when exhausted to a high or x-ray vacuum and energized from a powerful static machine, will be found a valuable means of treating conditions of altered nutrition as well as infections of the mucous membrane of the vagina.

When the vacuum electrode is excited from the negative pole of a static machine, its distal end becomes highly fluorescent, emitting intense actinic and mild x-rays. Its effects are first to produce tissue contraction, but the actinic discharge also exercises a germicidal action, which has been found to extend to a depth of from 6 to 10 mm. There is also a blanching of the mucous membrane and all local tenderness is markedly relieved.

The applications must be repeated at sufficient intervals to prevent

the beneficial effect following each treatment from becoming exhausted.

When the positive pole is the source of energy, the distal end of the vacuum tube presents an entirely different appearance. No intense actinic or x-ray fluorescence is observed, and the electrical discharge is strongly stimulating and produces a pronounced, though comfortable hyperemia.

In cases of senile atrophy of the vaginal mucous membrane with the many troublesome symptoms for which such patients seek relief, the application of this modality (as frequently as the effects indicate) improves the nutrition of the affected structures and changes the character of the irritating secretions, so often present, and thus renders the patient much more comfortable.

High Frequency Current.—The commonly termed high frequency electrical current and its two important subdivisions, local and general diathermy, may be briefly defined as a very rapidly oscillatory current which is converted into heat by the resistance it encounters and the molecular motion set up in the living tissues. The newer type of high frequency electrical apparatus enables us to introduce heat even into the deepest structures, and this in a definite dosable amount. The preliminary use of local diathermy to heat thoroughly the parts to be treated, will greatly increase the therapeutic efficiency of the static wave current, the sinusoidal current, and negative galvanism. Moreover, it will not only intensify the action of the x-ray, but will fortify the healthy tissues against the profound effects of heavy roentgentherapy.

Having described the effects of the different currents I will briefly refer to some of the more common conditions in which, according to my experience, their use, singly, or in combination, has been found especially serviceable.

DYSMENORRHEA

When due to cervical obstruction: Galvanic current with negative pole electrode inserted in the cervix, increasing the size of the electrode at each sitting. Strength of current 2 to 10 M. A., thirty minutes, twice weekly. After the dilatation, a positive rod electrode of either copper or zinc is introduced up to the fundus, with the negative pole attached to a large pad of dispersing electrode, which is applied to the surface of the abdomen and held firmly in place by a sand bag. Spasmodic type: A suitable metal electrode is inserted into the rectum and the static wave current, which is obtained from the positive side of the static machine, the negative pole being grounded, is applied in increasing intensity to the point of tolerance.

In cases in which dysmenorrhea occurs in connection with pelvic

adhesions, ovarian dysfunction or disease, or uterine displacements, a combination of methods is indicated.

CASE REPORT.—Diagnosis: Dysmenorrhea. Eleanore B., age forty-two. Suffered from painful periods from the beginning of her menstrual life. At 25 years of age uterus dilated and curetted with only temporary relief. At the age of 30 the uterus was again dilated and curetted but at this time the procedure was followed by an acute pyosalpingitis which opened spontaneously and drained through the uterus. Presented herself two years later for treatment of recurrence of the postoperation infection. Examination: uterus fixed, tender and drawn to the opposite side. No abatement but an increase of intensity and duration of her dysmenorrhea. Negative galvanism and iodine ionization, bi-weekly application for three months, then at weekly intervals, entirely cleared up all evidences of the pelvic disease and up to August, 1922, no evidence of any return of former condition has occurred, as well as a disappearance of all pain at her regular menstrual periods.

SUBINVOLUTION

In the treatment of the various degrees of subinvolution we have in electrotherapy a remedy which far surpasses in definite and satisfactory results any of the customary methods in vogue today. Without dwelling upon the usual structural changes present in this condition, we can for convenience classify the cases under two headings, viz., those following an interrupted pregnancy and those occurring when the convalescence from a full term confinement is retarded by general relaxed state of the patient's musculature.

In the first group the static wave current is especially useful. Its method of applications is as follows: Either a suitable metal electrode is introduced into the rectum up against the body of the uterus, with the patient in the Sims position in a static chair on an insulated platform, or a vaginal metal electrode is passed into the posterior culdesac of the vagina, the patient resting upon the back. The intensity of the current will depend upon the sensitiveness of the parts. The duration of treatments should be from 20 to 30 minutes, these being repeated at intervals of 3 to 6 days or more.

In the second group, because of the more pronounced uterine changes, a combination of diathermy and the x-ray is the method of choice, although the static wave current will prove a valuable auxiliary.

CASE REPORT.—Diagnosis: Chronic Subinvolution. Mrs. S. Age thirty-three. Married 13 years. Three children, ages twelve years, eight years, and eight months. After the birth of each child there was slow convalescence, due to subinvolution of the uterus. Menstruation usually returned three or four months after childbirth, and was very irregular, frequent and prolonged. Was treated for her subinvolution four years after birth of first child, then remained well until after the birth of the second child when she came for treatment about four years afterwards. At that time she presented with her symptoms of subinvolution marked evidences of hyperthyroidism. With the correction of the condition of subinvolution the symptoms of hyperthyroidism entirely disappeared and apparent normal health was regained.

Was advised, should she bear another child, to come for treatment as soon after its birth as her opportunities and condition would permit, so that patient was taken under observation about ten weeks after the last birth. Marked subinvolution, general flabby condition of musculature, mental depression, constant headache, decided melancholia. Uterus enlarged, soft and retroposited. Uterine canal would admit forefinger easily and measured six inches in depth.

Treatment, static wave current followed by iodine ionization at the same sitting, at bi-weekly intervals for six weeks. Then twice a month for two months, then after each period only. Patient wore during the intervals of treatment a well fitted pessary which was finally removed two months ago. Today, December 30, 1922, uterus normal in size and position. Patient feels thoroughly well.

CASE REPORT.—Diagnosis: Chronic Subinvolution. Mrs. C. W. N. Age forty-one. Came November 29, 1920, for treatment of a slowly enlarging thyroid which began about 2 years previously. Examination revealed a mild fibromatous uterus, endometritis and menorrhagia, associated with the subinvolution. In this case there was employed metalic ionization to the endometrium in conjunction with a proper application of the x-ray to the lower abdomen which relieved the cause of the pelvic disturbance together with the disappearance of the thyroid enlargement.

PELVIC ADHESIONS AND INFILTRATIONS. In this condition, if the adhesions or infiltrations are of recent origin, they can often be caused to disappear by iodine ionization employed in the manner previously described.

The applications are made twice weekly and the duration of each treatment should depend upon the time required for the complete absorption of the iodine from the gauze covering the electrode— 10 M.A. of current for 30 minutes is usually sufficient to accomplish this.

CASE REPORT.—Diagnosis: Pelvic Adhesions. Mrs. H. Age forty-three. Mother of three children. Very painful periods from puberty until after birth of first child. Menstruation more or less distressing during last two years. August 22, 1922, acute pain in right ovarian region occurring during a normal period, the flow ceasing at the onset of the pain. Came for treatment August 24, for large mass in right side—uterus fixed and very tender. Two full doses of the x-ray in succeeding days relieved the acute pain. Patient returned to the country where she remained invalided for six weeks, after which treatment was resumed and consisted of negative galvanism by an intrauterine electrode to dilate the constricted cervical canal. The third application of this procedure resulted in a profuse discharge of bloody mucus and pus, with great relief of tension and tenderness in the region of the right broad ligament. These treatments were continued bi-weekly, alternating with iodine ionization per vaginam to the mass of exudate in the right side. Examination January 2, 1923, no evidence of previous trouble found.

CASE REPORT.—Diagnosis: Postoperative Pelvic Infiltrations. Mrs. David P. Age fifty-three. Hysterectomy five years ago for nonmalignant condition of uterus. Uninterrupted convalescence except reflex symptoms of intestinal indigestion which gradually ceased after one year. Since has developed symptoms of pelvic tension, irritation and persistent obstipation as well as rectal and vesical spasm.

Examination revealed a tense, tender and boggy condition of vaginal vault. Treatment by diathermy, followed by iodine ionization until all tenderness was re-

lieved and then the galvanic sinusoidal current has apparently restored the patient to normal health.

No return of former inconvenience one year later.

DISPLACEMENTS

The first step in the electrical treatment is to establish uterine drainage by means of negative galvanism with the intrauterine rod electrode. As already explained this produces relaxation of the constricted cervical structures.

After this has been accomplished, any existing exudate is treated by iodine ionization until the uterus becomes movable and can be readily replaced. When this desirable end is secured the tone of the relaxed uterine and pelvic structures, as well as of the abdominal muscles, can usually be restored by a combination of the sinusoidal and faradic surge currents. While the treatment of this condition is tedious, and must be kept up for months and even a year in some cases, the results are often superior to those obtainable by operative procedures.

CASE REPORT.—Diagnosis: Malposition and Dysmenorrhea. Grace S. Nineteen years old. Fairly well developed girl. Came under observation two years ago for treatment of severe form of dysmenorrhea. More pronounced when she was lying down so that sleep was almost impossible during these trying periods. Examination by rectum found the uterus swollen, retroposed with cervix pointing above the symphysis pubis. Negative galvanism at weekly intervals between periods for three months and then just preceding the normal menstrual time has entirely relieved all symptoms of dysmenorrhea and reduced the time of flow to three or four days. The uterus has assumed its normal position, due to the re-establishing of drainage, relief of muscle spasm and conjestion of the uterine body and improvement in the circulatory disorder of the pelvic viscera.

INFANTILE UTERUS

It is no exaggeration to say that electrotherapy will accomplish more in this class of cases than any other method of treatment, as strikingly shown by the results reported by such high authorities as Barton Cook Hirst and G. Bettan Massey of Philadelphia.

The modalities especially indicated are mild negative galvanism for twenty minutes with the active electrode in the uterus, to be followed at the same sitting with the sinusoidal current for a like period. These applications are repeated at weekly intervals.

CASE REPORT.—Diagnosis: Infantile uterus. Marjorie C. Age eighteen. Came November 24, 1921, for the treatment of hyperthyroidism.

Mother called attention to the girl's irregular and scanty menstruation and a persistent leucorrheal discharge. Examination revealed a type of infantile uterus but the discharge was due to an infection by the colon bacillus. Negative galvanism, followed at the same sitting by the galvanic sinusoidal current together with such medicinal remedies as were necessary to correct some intestinal disturbances,

has caused first the leucorrheal discharge to clear up, the menstrual periods are now normal in both frequency and duration and all symptoms of hyperthyroidism have entirely disappeared.

STERILITY

In those cases of sterility due chiefly to cervical stenosis and under-development of the uterus, negative galvanism as previously described, by relaxing the tissues, promoting drainage, relieving congestion and improving the nutrition and tone of the pelvic organs, will often give more satisfactory results than the methods of treatment commonly in use.

SALPINGITIS

It may appear presumptuous on my part to urge a trial of electro-therapy in this class of cases which is generally regarded as belonging to surgery. My experience, however, has shown that some of these patients can be greatly benefited or permanently relieved by electrotherapeutic measures. Good results are obtainable, particularly in acute conditions, by several full doses of the x-ray applied to the abdomen over the affected region. This often arrests the acute process, and after its subsidence, drainage of the accumulation in the tube through the uterus may be promoted by negative galvanism with the intrauterine electrode, thus obviating surgical intervention.

Even in cases of thickening of the tubes and pelvic adhesions, iodine ionization has often given the most brilliant results.

CASE REPORT.—Diagnosis: Recurrent Salpingitis. G. P. H. Age forty-six. Normal early life. Married thirteen years. Aborted (two months) seven months later. Gave birth to seven month child within ten months thereafter. No known cause for either interruption. Three months after birth ill with right salpingitis which subsided after three weeks care in hospital. General condition below normal from then on.

Recurrent attack of salpingitis five years ago and another about two years ago for which I employed negative galvanism until drainage was established, then iodine ionization to area of exudate until its apparent absorption and the uterus freely movable, without tenderness and in normal position. Today there is no sign by careful examination of any pathologic condition in pelvis.

In conclusion there seems hardly any need to point out that to obtain definite and permanent improvement from electrotherapy in gyne-cologic cases, its use must be supplemented by the treatment of any other disorders that are so frequently present.

127 WEST ELEVENTH STREET.

Society Transactions

Dr. A. J. Rongy, New York, N. Y., presented a paper entitled **Primary Sterility.** (For original article see page 631.)

DISCUSSION

DR. ROBERT T. MORRIS, NEW YORK CITY.—Dr. Rongy brought out the fact that a narrow internal os or an obstruction of that sort is of very little consequence, so far as the passage of spermatozoa is concerned. After opening the cervix by dilatation there have been, however, a number of pregnancies reported, and such results cannot be put aside. The results to my mind mean this. You change temporarily in some cases the character of the secretions. For instance, in some instances of sterility, you find a highly acid secretion, and dilatation or insertion of the stem may change the relative acidity, thereby favoring pregnancy.

Dr. Rongy did not tell us what he did in the case in which he had excluded everything and finally found closed tubes. In one case I found the tubes closed congenitally and short circuited one closed tube by grafting the ampulla up into the cornu. I had so little faith because of the delicacy of the structures in this case that I only did it on one side. This patient has since had two children, one of them very defective.

Dr. Rongy did not tell us what to do in the gonorrheal cases. He speaks of permanent sterility. That is not so. Usually, if you incise a clubbed tube, with nothing normal left in sight, plugged, ragged, bleeding, and split it lengthwise to the cornu, leave it wide open, and go in at the end of three months later, you will find fimbriae that you had not expected. You can make these patients have an open tube. If the tube is closed by scar tissue, split it, leave it wide open, and when you go in at the end of two or three months, three-fourths of the tube may be quite round and patent. If such patients are given gonococcus vaccines for six months or a year, after saving the tubes, they are likely to overcome the sterility. I would not call these ''permanent sterility cases.''

DR. JAMES N. WEST, NEW YORK CITY.—I would say that the usual classification of sterility is primary and secondary. Primary sterility is a condition of azoospermatism, that is, the subject has not secreted the proper germ, in the female, the ovum, in the male the spermatozoon, an entirely different thing from the chief subject of this discussion. It would seem that the paper and

most of the discussion refer to secondary sterility. Primary sterility is not present if the patient is capable of secreting an ovum, but all sterility which is due to tumors, displacements, lacerations, or other mechanical causes, is secondary. As a matter of fact, I can say to Dr. Rongy that I think I have cured several cases of long standing sterility by amputation of the cervix, at about one-third of an inch below the internal os, this operation allowing the uterus to straighten itself out, the canal remaining open to the spermatozoon.

In regard to chemotaxis which exists, affinity between living fluids, it is beautifully and delicately arranged by nature. The vagina has a natural acid secretion which when mild stimulates the action of spermatozoa, whereas in the uterus the secretion is alkaline. A mildly alkaline solution favors the life of spermatozoa, so that if we have an endometritis and an excessive alkaline secretion we may destroy the spermatozoon before it has had time to come in contact with the ovum. If in the vagina there is an excessively acid secretion, it may overstimulate and destroy the activity of the spermatozoa. Normally a woman is balanced.

I have seen a case in which a couple were married a number of years and no conception took place. Trouble occurred and a divorce obtained. These people married, and each one had children afterward. This suggests the possibility of some biologic law which effects sterility in some cases.

DR. CHARLES L. BONIFIELD, CINCINNATI, OHIO.—I cannot quite agree with some of Dr. Rongy's conclusions. In the first place, I do not believe that sterility has not been cured by dilating the cervix and curetting the uterus. It happens too often to be a mere coincidence. How does it act? Dr. West has said what I wanted to say. It is this: It is not that the pin hole os is too small for the spermatozoa to get through; of course not, but the cervical canal is too small for the uterus to drain its own secretions, and as a consequence of that lack of drainage endometritis develops, and that is the cause of the sterility. A woman begins to menstruate at the age of 16 or 17, without much difficulty, although a little scanty at the time. She may have been menstruating for three years and then she gets an intense dysmenorrhea. What does it mean? It means the cervical canal is bent, and the mucous membrane becomes swollen, the secretions of the uterus do not get out, she develops endometritis, and that is the cause of the dysmenorrhea. Another fact to be borne in mind is that oftentimes by dilatation and gentle curettage we can stimulate the uterus to function better. I well remember a case, a Sister of Charity. Sterility had nothing to do with the case, but this woman was under my care for fifteen years, and she would get so that she could scarcely menstruate at all. Menstruation was very painful. I would dilate the cervix, pack the uterus with gauze, and put her through a miniature labor, and for three years she would menstruate freely; then I would perform the operation again. I did this until she developed a fibroid, then I removed the uterus.

DR. H. WELLINGTON YATES, DETROIT, MICHIGAN.—It may be possible that at some future time we will be able to type patients before they are married. However, it seems to me that it does not depend so much upon a crooked path of the canal as it does upon endometritis, so-called, or upon endocervicitis. I do not believe endometritis exists as such very long. Endocervicitis is a different thing, inasmuch as the compound type of glands do not rid themselves of the discharge, which is definitely the inhibiting factor.

I was interested to know how Dr. Morris had effected a cure of these cases by splitting these tubes from their ampullar end toward the uterus. I think it is the experience of many men that the closure is not at the ampullar end, but very often in the isthmus or at the proximal end of the uterus, or in that proximity, and merely splitting the tube up to that surface will not suffice in perhaps more than 50 per cent of the cases.

I was interested also in a remark by the essayist, if I understood him correctly, namely, he had passed a tube in 200 cases from the ampullar end of the tube down to the uterus. All the cases we have had in our service of late would admit but a small probe, for about two or three centimeters from the uterine end there is a kink which was normal to the tube and did not admit a probe under normal conditions.

DR. JAMES E. DAVIS, DETROIT, MICHIGAN.—May I call attention to a small percentage of cases that are due to delayed or arrested development of the oviduct. You will all recall that the oviduct, when undeveloped, has a number of fairly definite kinks or waves in its course. In a certain percentage of cases this anatomical condition is carried over into adult life. When that is the case, the circular muscle layer is thick, not only at the proximal end, but practically throughout the entire length of the tube. The normal disproportion between the circular layer and the longitudinal layer does not develop. This should obtain toward the distal end in order to insure the normal function of propulsion.

What Dr. Morris has said relative to the ability of the oviduct to recover after gonorrheal infection is very true. The ability to recover is wonderful. I called attention to this remarkable repair in a former paper. After a rather extensive microscopic examination of a large number of oviducts, I was able to observe the repair process in the different stages, and it seems simply wonderful how frequently the tube can repair. Only after streptococcic infections is this ability to repair frequently and seriously impaired.

DR. STEPHEN E. TRACY, PHILADELPHIA, PENNSYLVANIA.—We know so little about this subject that every recognized fact should be brought out. A certain number of women with a deep vagina do not conceive. After intercourse the fluid runs out and never reaches the cervix. A certain percentage of these patients will become pregnant if they have intercourse in the knee-chest position soon after the menstrual period. There is a class of women who do not have intercourse before eight to fourteen days after the menstrual period and they do not conceive. Many of them will promptly become pregnant when they have intercourse soon after the menstrual period. Some women do not conceive because of improper method of coition. When a patient comes complaining of sterility, a most careful detailed history, including the sexual habits, should be taken. Before any operation is undertaken on these women in the absence of pelvic pathology or anatomical abnormalities, the husband should be examined. There are thousands of these women subjected to unnecessary and useless operations.

DR. WILLIAM PFEIFFER, BROOKLYN, NEW YORK.—I wish to make an urgent plea for conservation of the tubes. Curtis has shown definitely that the gonorrheal tube, if infection is not accompanied by the streptococcus or staphylococcus, sterilizes itself quickly. The streptococcus may remain latent in the tube for two or three years.

I delivered a woman this spring who had had a tuboovarian abscess removed from the right side, the left tube did not then appear to be in good condition and I was tempted to remove it, but bearing in mind her desire for maternity, I left it. The woman subsequently developed quite an enlargement of the left tube and I advised its removal, which was refused. It was a gonorrheal tube which healed in a mysterious way. Conservation of tubes is to be practiced except in the presence of abscess.

DR. WILLIAM M. BROWN, ROCHESTER, NEW YORK.—I would like to raise the question of the possibility of local tuberculosis being often an unrecognized source of occlusion of the tubes.

DR. RONGY, (closing).—In a paper on sterility, which is shortly to be published, I have covered almost every phase of the discussion that has taken place here, including the "donor law," as mentioned by Dr. Heyd. We have taken a series of sterile women and their husbands and have typed them, and we also took a series of patients from the obstetrical ward and their husbands and typed them. We found that there exists practically no difference in the blood groupings in those women who are sterile and the women who have borne children.

With regard to the testing of the vaginal and cervical secretions, that has been carefully studied by my associate, Dr. S. S. Rosenfeld.

As to the statement, made by Dr. Morris, that we can expect good results in 15 per cent of the cases who have had plastic operations performed on the fallopian tubes, I will admit that this high percentage of good results may be true of the patients operated upon by Dr. Morris or equally good surgeons. But, if one watches some of the plastic operations, which are performed on the fallopian tubes for the cure of sterility by some of the surgeons in New York, he will not at all be surprised why the results after such operations in the hands of the average surgeon are not so good.

Dr. Bonifield convicted himself when he said he curetted a woman for dysmenorrhea, and that the same patient later developed a tumor of the uterus.

DR. BONIFIELD.—The dysmenorrhea was not due to endometritis.

DR. RONGY.—In that particular case, surely, it was not the endometritis that caused the dysmenorrhea. When a woman has dysmenorrhea and later develops a fibroid, it shows there is something wrong with her constitutionally. The dysmenorrhea is usually of ovarian origin, and in your case, Dr. Bonifield, her dysmenorrhea was undoubtedly of ovarian origin, caused by the fibroid.

Dr. West raised the question whether there is such a thing as primary sterility in women. I feel that primary sterility may be due either to the male or female. Regarding his statement as to the amputation of the cervix, I remember very well about 15 years ago, when it was the custom to amputate the cervix for the cure of primary sterility. I also remember a number of these patients, who became pregnant and aborted.

When I spoke about inserting a cannula through the cervix into the uterus, I had reference to a Holzman cannula, and I maintain that when one can pass a No. 6 Holzman cannula through the cervix with comparative ease, an obstruction in the uterine canal does not exist in these patients and the patient is not suffering from mechanical obstruction in any part of the uterine canal, which would cause her to be sterile.

I think Dr. Dickinson touched on a very important point in the use of contraceptors. All of us have had patients, who have prevented pregnancy for a number of years and when they wanted to become pregnant they could not. The changes produced in the vaginal mucous membranes by these contraceptive medicines, whether it is bichloride, resorcin, or quinine, were such that it interfered with the proper function of the vaginal mucous membranes; very often these patients come to us for advice, and tell us that they have stopped the use of contraceptives and still do not become pregnant. I am sure this is due to the changes produced by the various chemical substances, which these contraceptive agents are composed of.

Dr. Tracy mentioned a case of a couple, the husband being a Columbia and Harvard graduate, who did not know the proper way to have sexual intercourse. To my mind this is a reflection on the education given at these universities, and it really needs no further comment. Regarding intercourse in the knee-chest position, I pointed that out in an article I had published in 1911.

As to the sexual history of the patient, I think that must be thoroughly studied, for very often a great amount of knowledge may be derived from a real analysis of the sexual history.

I do not agree with Dr. Tovey. I never saw a patient benefited by any of the organic extracts for any length of time. They may improve temporarily, but the menstrual disturbances usually recur, no matter how much of the organic extracts we might have given them.

There can be no question but that tuberculosis of the tubes plays a great rôle in the etiology of sterility. Only the other day I operated on a patient; I found the tubes patent, but very much thickened. Sectioning of the removed part of the tube disclosed that the woman suffered from genital tuberculosis. Tuberculosis of the genital organs is more frequent than most of us surmise.

DR. H. E. HAYD AND DR. IRVING W. POTTER, of Buffalo, N. Y., presented a paper entitled **Symptoms and Signs of Extrauterine Pregnancy at or Near Term, with Report of Two Cases and the Treatment of Late Ectopic Gestation Together with a Review of the Literature.** (For original article see page 601.)

DISCUSSION

DR. GORDON K. DICKINSON, JERSEY CITY, NEW JERSEY.—About fifty years before McDowell did his celebrated ovariotomy, John Bard did a laparotomy on a woman and delivered a nine months' fetus. I well remember in the eighties amongst my early operations being called to a tenement house to see a woman who was waiting for the delivery of her child. She was three months over time. At the end of the normal period the milk left the bosom. There was a decided change in her appearance, her appetite was lost, the skin became shriveled. Nature will not let labor go over a specified time. I found she had gone three months after the regular time and discovered a shriveled up mass which looked like a dried up potato. We took her to the hospital, and Dr. Andrew McCosh assisted me with the operation. A large incision was made; the membranes looked like grocer's paper. We took out the baby, which was dead. We packed freely with iodoform gauze and she died on the next morning. Autopsy disclosed that we had tied off one ureter, and that was the cause of death.

I had a case not long ago which was diagnosed as cholecystitis. I cut down to operate on the gall bladder and found a three months' child hanging from the lower surface of the liver.

DR. RUFUS B. HALL, CINCINNATI, OHIO.—I would like to emphasize one point, that in all these cases a certain diagnosis should be made at once, and I do not say this in a spirit of criticism at all. If Dr. Hayd had given his patient the benefit of a doubt about the condition at his first visit, by giving her an anesthetic, he would have operated and saved the mother in this case. I adopted this plan many years ago, without any reference to what the family or the neighbors or the doctors would say, whether right or wrong, the plan in all doubtful cases to make a diagnosis, if that is impossible, by doing an exploratory operation.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—When abdominal pregnancy is suspected, about the sixth or seventh month one of the best aids for diagnosis, that we have at the present, is the x-ray, which will differentiate it from a tumor or a cyst.

As far as the placenta is concerned, I think it is a great mistake to remove

the placenta unless we find it shriveled up in the abdomen, as I have found it in two cases. When the placenta is adherent to any part of the intestines or the abdominal wall and the circulation is actively going on, it is better to leave the placenta and not attempt its separation.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—The statement was made by the previous speaker that he had never found the x-ray satisfactory in pregnancy earlier than six or eight weeks before full term. I would question the accuracy of that statement, and in this Association it ought not to go unchallenged because in the City Hospital in Louisville, we have now quite a series of successful x-ray outlines of fetuses that we can use for teaching purposes. This operator has a picture of a fetus at four months and is trying to get them even earlier.

Another thing that we do in Louisville, in all doubtful cases of pregnancy is to examine the patient under nitrous oxid anesthesia, inserting the full hand, if necessary, into the vagina.

DR. H. WELLINGTON YATES, DETROIT, MICHIGAN.—I also wish to accentuate the point made by Dr. Hall in relation to the early diagnosis being made under an anesthetic; also to repeat what the last speaker has said in relation to the x-ray in early diagnosis.

DR. WILLIAM D. PORTER, CINCINNATI, OHIO.—I wish to mention very briefly a remarkable case I saw in the service of Dr. William Gillespie in the Cincinnati Hospital. In this case the child was probably a little over eight months; the head was well down in the pelvis, the uterus being displaced laterally, so that the head could be felt distinctly and the sutures made out beyond any question. The stretching was so great the tissue seemed thin between the finger and the child's head. In this case an incision was made through the vaginal tissue, forceps were applied and the child delivered. The child weighed nearly five pounds and was not deformed. The cavity was packed, and the drainage kept up for a long time, and the child and woman recovered.

DR. HAYD (closing).—An interesting point in connection with this subject is that Dr. Potter should have had two of these cases in one year and yet in an experience of 15,000 confinements and over 500 cesarean sections, he had never seen such a case before nor had I ever met one. Dr. Hall is perfectly justifiable in his criticism, and in the summation of my paper I said the diagnosis should be made and I think I would have made it in Dr. Potter's second case. My patient was suffering from obstruction of the bowels, but how complete I could not tell. However, I knew she was very sick and it was no place for an immediate operation. I gave morphine and tap water by rectum and the next day she passed gas freely. Two days later Dr. Potter came home and I turned the case over to him urging him to operate, as I was satisfied it was a case of fibroid tumor with pregnancy, at or near term. I never thought of an extrauterine pregnancy and really it did not matter, because here was a uterus which low down felt like a fibroid tumor and no baby could have come through it had it been a tumor. I believe, we would have saved both woman and baby, although Potter could not get any fetal heart sounds when he examined the woman and it may be that the baby had died and the woman was in false labor, when I first saw her. We had had two or three large multilocular cyst operations in women about forty-five years of age where the diagnosis was difficult because of suspected pregnancy and as this woman was doing nicely, Potter felt like letting her alone for a few days, when suddenly she grew worse, the sac, no doubt, ruptured, and the contents, liquor amnii and blood went into the belly cavity. I intended on the following day, after I first saw her, to put a sound into the uterus and clear up the diagnosis. We could have done no harm and it might

have cleared up the case. I felt the extremities of the baby and I heard fetal heart sounds and there was every indication that the baby could not be born with this obstructing mass below and advised cesarean section.

DR. GEORGE W. CRILE, Cleveland, Ohio, presented a paper entitled **The Defenseless Areas of the Abdomen.** (For original article see page 620.)

DISCUSSION

DR. ROBERT T. MORRIS, NEW YORK CITY.—It would be interesting to know the relation of the trophic nerve supply to certain undefended areas, and I would like to have Dr. Crile apply his philosophy to one question, namely, the failure of union of superficial tissues at a point below the xiphoid. Sometimes in operations upon the upper abdomen in the midline there is a failure of union, apparently where there is no infection. Not long ago I had a case in which there was complete failure of union; the incision opened and in speaking of it before the Surgical Society in New York I found two other surgeons had had similar cases. There were three cases in which there was failure of union below the xiphoid. My explanation is this: some time ago Ross and Sherrington showed that various organs have peripheral representation. Head classified the data and mapped out certain zones belonging to various organs. The Head zone for the gastric area is a line drawn between the navel and the interval between the ninth and tenth ribs on each side. It seems to me, in all probability that a very high midline incision and gastric operations would probably disturb not only the sensory nerves in this vicinity, which would make a response on the part of sympathetic, but incidentally the trophic nerves at the same time and fail to carry on defense and repair.

DR. CRILE, (closing).—In regard to Dr. Morris's discussion, I should like to add that when we are able to chart the human organism as a whole we shall probably find that there is an extraordinary relationship between the richness of the nerve supply and blood supply, both of which are defensive mechanisms. There are certain veins which have no sensory nerves, and if we get an infection of one of those or of the meninges we have difficulty in achieving a successful result. Such patients usually die. In those cases in which the meninges are involved in operations upon the spinal cord, there is no sensation, yet, if infection develops the patient will have a bad time and generally dies. This is true also of the mediastinum, and of the endocardium. In those cases in which there is a hematoma in the deep muscles of the back with resultant infection on account of the low degree of defense, the case may go on for months. In operations upon the abdominal areas therefore it is a good thing to bear in mind that there are these enormous differences in the degree of protection of different areas with no defense whatever in certain parts.

DR. R. E. FARR, Minneapolis, Minn., presented a paper entitled **Surgical Strategy as an Adjunct to Local Anesthesia in Abdominal Surgery.** For original article see page 624.)

DISCUSSION

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—About eight years ago I was much impressed with the work that can be done in the pelvis under local anesthesia. At that time I had referred to me a woman who by instrumentation

sustained a puncture of the uterus at delivery. Following this she had for several weeks been bleeding at intervals, and when I saw her the blood was so impoverished that her tissues were generally edematous; her labia were like sacs of water; her face was bloated; her red blood cell count was 1,145,000; her hemoglobin was low— in fact, so low that it could not be estimated away from the bedside, at the bedside it was 20 per cent. We dared not give her a general anesthetic. She was placed in the Trendelenburg position, and to my great surprise we were able to do a hysterectomy, using novocain solution, one-half of one per cent. She left the hospital the nineteenth day after operation, with a blood count of about 3,000,000.

There is one more point I desire to call attention to. Some of you may have felt when you saw Dr. Farr inserting these large needles in the upper part of the thorax and neck, that there was great danger of puncturing the blood vessels. The large arteries have strong thick walls, the solution precedes the point of the needle and as it approaches these arteries they are not injured, but rolled out of the way. In the veins pressure is low and if the needle should puncture one, there is no danger providing that while you are making infiltration the needle is all the time on the move. The solution is going in as the needle advances, also as the needle is withdrawn, so that there is no danger of getting much of the anesthetic solution into the vein. In other words, the danger of puncture of veins or arteries is negligible.

DR. ABRAHAM J. RONGY, NEW YORK CITY.—When I was in Paris during the month of August, I saw one of the leading surgeons there operate under regional anesthesia, and while he did not have the equipment and the appliances that Dr. Farr has at his command, still it was done well.

I think Dr. Farr must realize that a great many of the public institutions, semiprivate or charitable, will not equip the operating rooms with the necessary paraphernalia and assistants, as suggested by Dr. Farr. Dr. Farr has been very fortunate in convincing the Board of Directors of his institutions to expend the necessary amount of money for the equipment.

Most of us know that it is very difficult to obtain funds from the governing bodies of these institutions for equipment, which they think is not part and parcel of the routine expenditures of the hospital.

DR. J. F. PERCY, SAN DIEGO, CALIFORNIA.—There is one phase of the subject of local anesthesia as presented by Dr. Farr that may be of great practical importance in the surgery of cancer. If the observations of Gaylord and his associates some years ago are correct, the administration of either ether or chloroform lowers the natural resistance to this disease that undoubtedly exists in these patients. I have been greatly impressed with the work of Gaylord, so much so that I am never altogether happy when I give a general anesthetic to any patient suffering from cancer. Gaylord in a personal communication told me further that his experimental work in this regard had not included the gas oxygen anesthesia, but from the theoretical view point it should be the least harmful of any of the general anesthetics. The local anesthetic technic so beautifully and so thoroughly described here today would almost certainly eliminate the dangers pointed out by Gaylord as being true of the two general anesthetics most frequently used. The only objection to this local method that I can imagine is the one of stimulating the growth to increased activity should the infiltrating needle unhappily invade a focus of malignant cells.

Contrary to the usual assumption the cautery knife technic does not require a complete anesthesia, and I am not now assuming that the infiltration of a procain solution does not or cannot be made to produce a complete anesthetic effect. The facts are that the cautery is the least painful method of severing the

tissues. This is something that surgeons have yet to learn, and also that the after effects of the use of the cautery, as far as pain is concerned, cause less suffering than is ever true following the use of the cold knife. The most comfortable surgical patients I have are those who have had an extensive cautery dissection of the breast and axilla. One of my devices is to take the hand of one of these patients the next morning following her operation and shake it rather vigorously. For a moment they are startled, but immediately they laugh. The practical reason for doing this is to teach the patient that she need not hold herself rigidly but can at once begin to use her arm as if there had been no operation. This stimulates an early return of function and it also aids in a more rapid development of the tissues necessary in the repair of the parts. The explanation of the freedom from pain is that my cautery knife puts what may be described as a leather cap on the end of every nerve I sever with it, so that conduction of the pain sense is absolutely inhibited. And so I repeat, local anesthesia by the methods of Dr. Farr may have a very great future in the surgery of cancer, and I hope to be able to develop it.

DR. ROLAND E. SKEEL, Los Angeles, California.—The matter of local anesthesia we have not developed to such a state of perfection as has Dr. Farr, but at the time of the above mentioned agitation which arose in the middle west regarding anesthetics, some of us were using a combination of local and general anesthesia, in a manner that any of us can carry out. Many patients who are not fit subjects for exploration under general anesthesia can easily stand an exploration under local, to be followed by nitrous oxide or ether if painful manipulations are required to complete the operation.

One should be skillful in the use of this preliminary local anesthesia and cause as little pain as possible, but when such a stage of the operation is reached that pain is inevitable, the patient takes his inhalation anesthetic without resistance, and if ether is being used, the operation is often completed by the time deep surgical anesthesia is induced.

If we have the two prime requisites, pure nitrous oxide and a skillful nitrous oxide anesthetist, then nitrous oxide is the inhalation anesthetic preferred, since the preliminary local infiltration overcomes muscular rigidity, which is the chief objection to the use of nitrous oxide in abdominal operations.

In the absence of a perfectly reliable nitrous oxide, and an equally reliable administrator, nitrous oxide is dangerous and ether is to be preferred.

DR. FARR (closing).—I might say that an apparatus for this kind of work can be, and I hope will be, devised if there is a demand for it, and if the doctors demand it in hospitals, I believe boards of directors will come across. We do not have any trouble of that kind; if we did, I would not get very far with the boards of directors of hospitals.

I am not wedded to local anesthesia; I am trying it out and telling you what I have done with this method at the present time. I may change my mind in three months. Crile's scheme may be a better one, but until many men have done what I have done, I do not believe we can know. The only way to get that experience is to do what Dr. Skeel has recommended. If we adopt the other method of bringing the patient to an unconscious state we never get anywhere.

PRELIMINARY REPORT OF THE COMMITTEE ON MATERNAL WELFARE*

(Appointed at St. Louis, 1921)

STATISTICS of morbidity and mortality, gathered in the United States during the last twenty years, 1901 to 1921, show that in toxemia and septic infection the curve of incidence is upward, in spite of the improvement shown by the records of our maternity hospitals in that period. This striking contrast demonstrates how easily the general condition may be ameliorated.

The fact that the large majority of the mothers of America are delivered in the home, and will continue to be managed by the general practitioner, explains the difficulty. It is the surgical operation in unsurgical environment.

It is desired to solicit the cooperation of the Fellows in the elaboration of a complete scheme of maternal welfare, emphasizing the most important points in the development of a plan, with the view of educating the profession and the public, as to the necessity of such work; and to serve as a basis for governmental activity, to be later inaugurated, cooperating with our individual efforts.

The following outline is presented as a suggestion of the needs which are paramount:

1. Preservation of the life and health of the mother.
   A. Decrease in the number of infections following abortion and childbirth.
      a. By providing better trained attendants.
      b. By educating the laity as to the necessity of proper preparation of the patient, and her proper supervision during pregnancy.
      c. By medical inspection and control of institutions caring for maternity cases.
   B. Prophylaxis of Pregnancy.
      a. Control of toxemias, by educating the laity to regard the importance of pregnant women placing themselves under competent medical care, and to be advised as to diet, and mode of living; and also as to the recognition of any symptoms which may arise.
      b. Prevention of venereal disease in association with pregnancy and treatment of such cases which develop.
2. Encouragement of the number of fruitful pregnancies.
   A. By lessening sterility.
      a. By prevention of infections following childbirth and abortion.
      b. By diminution of venereal disease, especially of Neisserian infection.
   B. Lessening the frightful prevalence of abortions.
      a. By decreasing the number of spontaneous abortions by educating young married women, who are pregnant, as to proper care when threatening symptoms develop.
      b. By lessening the number of induced abortions.
         a. Self-induced.
         b. Criminal operations.
         c. Therapeutic abortions.
N. B.
A. It is recommended that hospitals require the written sanction of at least two reputable medical men, before permission to perform an abortion is granted.

B. The desirability of having declared that abortions are reportable to the health authorities, should be discussed.

3. Diminution of the number of deaths of prematurely born infants.
   A. By education of profession and parents, and supervision of these cases.
   B. By provision for the better care of premature infants generally.
   C. By recognition and treatment of syphilis.

4. Diminution in the number of stillbirths.
   A. Improvement of statistics and methods of reporting stillbirths, with causes.
   B. By education of both profession and laity.
   C. By provision of better antepartum and intrapartum care.
   D. By better care of syphilitics.

5. Diminution in the number of neonatal deaths.
   A. By recognition of the importance of these deaths.
   B. By methods of prevention.
   C. By education of the profession and laity.
   D. By provision of better antenatal, intrapartum and postpartum care.

N. B.
   More careful scientific study of both stillbirths and neonatal deaths, together with causes of abortion, miscarriage and premature births is of vital importance.

6. Better facilities for the care of the unmarried mother, for her own protection and that of her offspring.
   A. A clear understanding of the relationship of this work to other health and welfare activities, such as infant and child welfare, venereal disease campaigns, Red Cross and nursing activities and to certain eugenic problems.
   B. Recognition of this need on the part of Boards of Health, and social agencies.

N. B.
   This problem is so often overlooked in many communities, the result is pathetic, indeed tragic.

7. Proposing some responsible agency of representative and well qualified men to advise with the governmental agencies on the problems of maternal welfare, which will consolidate the efforts of those interested in the welfare of mothers. This organization may be enlarged to become a part of an effective institution which could well be an advisory body on matters pertaining to public health and welfare.

8. To work out problems of maternal and child welfare in cooperation with the pediatrists, by means of a joint committee representative of the leading national societies.
   It is recommended that this committee act in cooperation with the similar committees of the American Gynecological Society, and the Child Hygiene Society, and that, therefore, the cooperation of similar committees representing these organizations and also the American Pediatric Society to elaborated maternal and infant welfare programs be secured.

N. B.
   Since the teaching of obstetrics covers so vast a field, and since the crying need for the immediate emergency may be met by the program here outlined, it is not deemed advisable to suggest any reform in the undergraduate teaching of obstetrics until a later occasion.

<div align="right">
GEORGE CLARK MOSHER, M.D.
Chairman
</div>

GEO. W. KOSMAK, M.D.
HENRY SCHWARZ, M.D.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF DECEMBER 7TH, 1922

THE PRESIDENT, DR. STEPHEN E. TRACY, IN THE CHAIR

DR. JOHN O. POLAK presented a paper entitled **What Constitutes the Surgical Cervix?** (For original article see page 640.)

DISCUSSION

DR. JOHN C. CLARK.—The reports of Dr. Polak's Clinic relative to the tracheloplasty originated by Sturmdorf have been very enlightening and in many respects we have followed this work along similar lines. In the discussion of any operation upon the cervix, particularly in child-bearing women, one must take into account its influence upon future pregnancies. It has been an accepted fact for some years, which has been sustained by reports from the Johns Hopkins Gynecologic Clinic and by subsequent articles from Dr. Polak's hospital that the nearer the encroachment upon the internal os in any plastic operation, the more likelihood of miscarriages. This, therefore, should be a guiding motive in any of these operations in order to reduce the hazards of miscarriages to the lowest possible rate. To this end we removed the smallest amount of tissue that is possible in these tracheloplasties and when available still limit our operation to the classic one laid down by Emmett. However, when there is an extensive erosion with an abundant leucorrhea, the taking out of a cone-shaped wedge, such as described by Sturmdorf, is an exceedingly trustworthy procedure, and we have found that it is one of the best remedies for the abrogation of leucorrhea as well as a logical prophylactic measure against cancer. If the woman has passed the child-bearing period or has a family of children with a considerable interval between the last birth and the operation and is within measurable limits of the menopause, we are not restrained by her maternal possibilities and, therefore, perform a much higher amputation. In the lesser degrees of erosions, particularly in young women, we have utilized to an excellent effect the plan of radial cauterization of the cervix, as suggested by Hunner. One of my assistants, Dr. Behney, has completed a series of cases in which this operation has been applied with a large percentage of cures. It acts with great certainty when the leucorrhea emanates from the cervix alone.

DR. BROOKE M. ANSPACH.—As Sturmdorf had proposed his plan chiefly for the purpose of effectually treating chronic cervical leucorrhea, it may not be amiss to review some of the ideas which he expressed at that time relative to the cervix and to cervical infections. He drew attention to the sharp line of differentiation between the cervical and the corporeal endometrium. He declared on good authority that there were rhythmic contractions of the uterus not only during pregnancy, but throughout its functional existence. These contractions maintain the nutritional and functional integrity of the uterus as a whole by stimulating the circulation and promoting the drainage of uterine secretion from the body and from the cervix. The muscular bundles of the cervix are disposed mostly in a succession of oblique segments and by contracting upwards spirally shorten the cervix and widen the os by their uncoiling, like the iris diaphragm of a microscope. The cervical lymphatics extend to the outer layers of the cervical muscle and thence to the peritoneal coat of the uterus, draining their channels at the base and at the top of the broad ligament. The normal course of the lymph

stream does not convey infection from the cervical to the corporeal mucosa, but along the muscular planes of the uterus as an ascending lymphangitis, progressing to the periadnexal ramifications, inhibiting tubal peristalsis and agglutinating the tubal ostia by velamentous bands; finally reaching and infiltrating the tunica albuginea of the ovary and impeding the normal rupture of the graafian follicles. This ascending intramuscular lymphangitis, and not an endometritis, links the pathology of the cervix with the impairment of the adnexal function. Sturmdorf classed the cervical mucosa as a uterine tonsil and said that the headache of uterine disorders was not neurotic (pinching of nerve terminals by cicatrices), but toxic (absorption of toxins from the infected cervix).

Infections of the cervix may date back to gonorrheal vulvovaginitis in early childhood, exanthematous diseases, scarlet fever, etc.

The symptoms of cervical infection may be local only, discharge and sterility from devitalization of the sperm, but when an ascending lymphangitis occurs, there may be circulatory stasis (menorrhagia, metrorrhagia), also a predisposition to abortion, sterility, amenorrhea (by delaying rupture of graafian follicles).

Relative to treatment, while dilatation and curettage and escharotics may benefit mild superficial infections, they accomplish nothing with the serious and the deep ones. Removal of the infected mucosa is required, but trachelorrhaphy and trachelectomy are objectionable during the child-bearing period as they divide the cervix fibers transversely. Sturmdorf planned his operation so as to get rid of the cervical mucosa by a cone-shaped excision and covered the raw surface by reflected mucosa from the vaginal cervix.

While these ideas of Dr. Sturmdorf have not been critically reviewed by Dr. Polak, the large number of times he has performed Sturmdorf's operations gave him an opportunity at least to test some of Sturmdorf's hypotheses, and it is rather a striking fact that the operation has cured so small a portion of cases of leucorrhea. A priori we might doubt the importance which Dr. Sturmdorf gave the cervical mucosa as a source of toxic symptoms, and although we know that bacteria of many sorts may thrive in that locality, and that the injection of a vaccine into the circulation produces headache, backache, fever, and other distressing symptoms, one naturally doubts Dr. Sturmdorf's position. Personally, I could not say that I had ever seen a chronic cervical infection giving rise to referred symptoms.

The path of ascending infection from the cervix to the pelvic peritoneum and the pelvic viscera, is as Sturmdorf has described it in postpartum and postabortive cases, but one must very seriously question whether it takes place at other times; and while no one may deny that, exceptionally gonococci may reach the tubes and the ovaries by the lymphatic route, unquestionably, as a rule, they advance along the surface of the endometrium. It is not surprising that so little histologic evidence of this involvement of the endometrium is found, when one considers the periodic reconstruction of the endometrium; we can hardly expect the evidences of previous inflammation preserved in such a membrane. Curettage alone as a curative procedure is very rarely indicated; but I think we go very much too far the other way if we say that curettage never does any good; for when the mucosa is hypertrophied and cystic, undoubtedly curettage may cure hypersecretion and menstrual abnormalities. In operations for intrapelvic gonorrhea, one of the most important features is to rid the patient of the foci of infection below and this includes curettage of the endometrium and flooding the cavity with iodine.

Dr. Polak had more tracheloplasties in the series of cases than any other form of operation. He evidently prefers it to amputation during the reproductive period. Such a position we must heartily endorse where there is cystic degenera-

tion of the cervix or a diseased mucosa or hypertrophied fibromuscular tissue that requires removal.

Sturmdorf's operation does more harm to the cervix than a simple trachelor-rhaphy, and should never be selected if the latter will answer, and as many cervical leucorrheas are due solely to eversion of the cervical lips and hypersecretion, trachelorrhaphy is all that is required to effect a cure. Indeed when infected or hypertrophied tissue must be removed, amputation with careful preparation of the outer flaps, sparing excision of tissue and accurate approximation may give results as good as tracheloplasty.   .

The value of local applications to the cervix in chronic cervical infection is limited. The difficulty lies in this that if we use chemicals or heat in sufficient degree to actually destroy the bacteria, we also destroy some of the mucosa, and produce scar tissue and contraction of the canal. Short of operation, about all one can do is to occasionally inject iodine into the cervical canal after aspiration of the mucus, puncture nabothian follicles, apply glycerine tampons occasionally and prescribe hot saline douches. If subsequent childbirth is not an important consideration, Hunner's cauterization is effective, and is, of course, weighted with the same objection as an operation. I heartily endorse what Dr. Polak has said concerning preoperative treatment for plastic cases. The patient need not be confined to the hospital for such treatment, however, and unless there is an ulcer, a week's rest in bed is all that is necessary. I personally think it is unwise to repair the torn cervix routinely during the reproductive period. Many women go through their entire reproductive period with only mild symptoms, and these are held in abeyance by an occasional douche. Operation at this time is unwise, for in the next labor the tear is almost certain to be repeated. Why not let the tear alone when by doing so dilatation of the cervix is facilitated in the next labor and new tears are avoided? After the child-bearing period has passed, or when further pregnancy becomes unlikely, then every tear should be repaired.

DR. CHARLES P. NOBLE.—I am confident that systematic preparatory treatment will very greatly lessen the number of cases in which it is necessary to do amputations or tracheloplasties, and increase the number in which trachelorrhaphy can be done. In my own work the following is the basis on which the different operations have been selected. If there is no extensive infection of the nabothian glands and if the hyperplasia of the tissues is not too great, I prefer trachelor-rhaphy in a woman of childbearing age, as undoubtedly it is much less apt to interfere with pregnancy in the sense of promoting abortion. Of the cases in which it is not indicated I think there are two classes. In the first class the cervix is relatively undeveloped, the "pin-hole" os of Marion Sims. I think that even when these cervices are not infected it is unwise to do trachelorrhaphy on them, because if patients become pregnant again the lacerations will occur in subsequent labor. Therefore low amputation of the cervix is preferable in the arrested development group. The second class is that with marked infection and hyperplasia. The older operation appeals to my surgical judgment as better than the newer one. Until the cone of tissue is removed and split open, it is a matter of guesswork as to how extensively the glands of Naboth are involved. Too much of the cervical canal can be removed, whereas in the modified Schroeder amputation the first step is to split the cervix and to remove the diseased cervical tissue under the guidance of the eye. Moreover the resulting stump is more nearly anatomically normal.

Dr. Polak referred to the position of the uterus in which the circulation was in equilibration. There is no doubt whatever that when a uterus is in the pelvis, below a certain level, it drags on the veins, and causes venous engorgement, the

importance of which has been very much minimized in the minds of gynecologists during the period of operative furor, and many of the symptoms that are attributed to infection, or to malpositions, are really attributable to edema which is associated with venous engorgement. Dr. Polak has laid a great deal of weight on the preliminary treatment which he says should be carried out over a period of weeks. My experience is that when this plan is followed, not only can a larger percentage of trachelorrhaphies and a smaller percentage of amputations be performed but also that patients recover more promptly after operation, and the number of patients requiring postoperative local treatment is lessened.

DR. HURST MAIER.—We are all fairly well in accord with the treatment of the surgical cervix, be it neoplastic, lacerated or hypertrophic in character. I agree with Drs. Polak and Clark that the ''single flap amputation'' is quite as efficient as ''Sturmdorf's operation.'' We all know that the removal of too much tissue from the cervix increases the probability of abortion and premature labor.

The cervix which is the seat of gonorrheal infection is comparatively frequent and very resistant to all methods of treatment.

This is quite remarkable, too, because of all the pus producing organisms the gonococcus is most easily destroyed thermically and chemically. The cause of its persistency is quite apparent, however, when we consider the anatomy of the cervical mucosa and the difficulty of bringing the bactericidal agents in contact with the organisms.

When a nulliparous woman is the victim, our method of treatment, in the absence of infection above the internal os, is quite plain. Dilatation and curettage above the internal os is never to be done. Persistent applications of the silver salts, mercurochrome, or other appropriate agents will usually bring about a cessation of the discharge sufficiently to enable conception to occur.

We are hopeful that clinical results will in time justify the use of radium as a therapeutic measure in these cases. The Beta rays, intelligently used, seem to have sufficient escharotic effect to destroy the tissues in which the organisms are without leaving behind permanent pathologic changes in the structures.

I agree that a restoration of the equilibrium of the pelvic circulation is most essential in the treatment of all diseases of the cervix. This can often be accomplished by the insertion of well placed lamb's wool tampons, pessaries, and douches of large quantities of hot saline solutions.

In the multipara, on the other hand, the disease has extended up into the tubes, and permanent relief of pain and discharge is not to be obtained short of the removal of the tubes and uterus. If the uterus or cervix is left in there is almost always contamination from above with recrudescent infections below. One or both of the ovaries can usually be saved.

DR. DANIEL LONGAKER.—It is my opinion, based on four years of use, that a very large percentage of these cases can be cured and cured in a very short time by proper cauterization. Close examination of these cases show that not only the glands that line the portio are involved, but the glands of the entire canal up to the internal os, and where you have a patent internal os you can take it for granted that that canal is diseased in its entire extent and if you are going to cure it you have to begin your cauterization at the internal os and bring it right down linearly to the external os. This is a very different thing to having a woman come to your office for four or six months making local treatments. You can cure these cases up in one or two applications. Another point made by one of the speakers was the operation for laceration of the cervix not to be done immediately postpartum. There are cases in which hemorrhage is due to lacera-

tion of cervix and these require immediate operation by suture. These cases occur in women spontaneously delivered, or instrumentally, or otherwise delivered. I think it is not only proper, but eminently desirable, that immediate suturing be done. I think the operation of secondary trachelorrhaphy is one that is *very rarely necessary*.

DR. F. E. KEENE.—I have had no experience whatever in the treatment of leucorrhea by radium. From many sources satisfactory results are reported, as for example, those of Curtis, who by means of small doses of radium applied to the cervix, finds the discharge is very much diminished or entirely cured. In reviewing our cases of benign uterine hemorrhage treated by radium, there have been quite a number of instances where an associated leucorrhea has been very decidedly benefited or entirely relieved, but in these instances the radium was applied, not with the idea of influencing the leucorrhea, but on the other hand to control the hemorrhage.

DR. RICHARD C. NORRIS.—The question of equilibration of the pelvic circulation is a very important one. Some of us may differ in regard to the operation. I agree with Dr. Clark and I think, too, Dr. Polak is in accord with him that the old single flap amputation gives equally good results as the cone-shaped operation of Sturmdorf and probably without so much mutilation. I think we should emphasize the fact that we must be very careful of the amount of tissue we remove from the cervix in order not to increase abortion and premature labor.

The recent cancer week prompts me to say a word on prophylaxis. These cases of hypertrophy of the cervix are of long standing infection. The recently revived interest in cervical infections should evoke surgical prophylaxis for these cases. I was surprised Dr. Polak did not say something about the immediate repair of the cervix, in which he believes, or at least the relatively early repair in which I believe. Why permit a woman's lacerated cervix to be neglected so long that you have to use a cautery, or resect, or amputate? It is my custom more and more in recent years, because we know that in many women even major injuries heal spontaneously, not to do the primary operation on the cervix, but at the end of a month the patient is examined and told if she needs operation and urged to arrange for its repair within a few weeks. If local treatment seems warranted, then is the time to treat it. You will be astonished how many of the less seriously lacerated and markedly infected cervices, early in the puerperal period, can be cured by treatment, Dickinson's plan of using the cautery if you choose, but I have had excellent results in infections from 5 per cent solution of mercurochrome. It has made operation unnecessary sometimes. Why neglect these cases until they become cystic and hypertrophied and require these more destructive operations?

If a woman is the mother of a number of children, she has put child-bearing out of her consciousness, or is reaching that age, and I agree heartily that we must get rid of the persistent discharge and backache; the only way to do it is to remove the uterus entirely, with the tubes. The second is the more complex problem of the nulliparous. She is usually infected in the early days of her married life and her desire is naturally to become a mother. We can almost invariably carry these patients along so that they will at least give birth to one child. We must be extremely careful that we do not carry this infection by dilatation or manipulation, beyond the internal os or else we defeat the very object of our work.

As an obstetrician who practices gynecology my plea is for prophylactic measures in surgery of the cervix.

DR. JOHN M. FISHER.—Dr. Noble has well said engorgement is due very largely to relaxed pelvic floor and that these injuries should be repaired early as well as those of the cervix. In diseased cervices described by Dr. Polak the glandular structure is the focus of infection and it is this glandular structure that should be removed. I am opposed to taking out a cone-shaped piece of the cervix. I split the cervix on either side and remove all of the disease bearing mucous membrane, saving as much of the vaginal portion as possible. The latter is utilized according to the Bonney method for covering the raw surfaces of either flap. The so-called Sturmdorf suture was first demonstrated by Dr. Alfred Heineberg long before Dr. Sturmdorf's description came out. In all fairness I think Dr. Sturmdorf in his book should have called attention to Dr. Heineberg's suture. I feel there are but few cases where trachelorrhaphy should be the operation of choice. Most of the cases I have seen with evil effects following amputation were due to the fact that too many sutures were used. I very rarely require more than four sutures in amputation of the cervix by Bonney's method. Following this operation upon examination subsequently, I usually find a cervix of about normal consistency.

DR. POLAK (closing).—In regard to the venous engorgement of the uterus, which has been brought out by Dr. C. P. Noble, I want to say that he is absolutely right, that a venous engorgement just describes this condition; we have proved it by the work of one of my associates, Dr. Gordon Gibson. He has recorded his observations in 1000 diseased cervices, treated locally, and found that no improvement could be made by any form of local treatment where there were relaxed vaginal walls, and uterine descensus, unless he put in a pessary and maintained the uterus in a plane of circulatory equilibrium. This to my mind is the best clinical proof that can be brought out as to the importance of relieving this circulatory disturbance.

In regard to preliminary treatment, I was brought up by Dr. Skene and those of you who remember Drs. Emmet and Skene, will remember how they did plastic operations. It was nothing unusual for a woman to be from ten to fourteen weeks in a hospital for a curettage, trachelorrhaphy and perineorrhaphy. They would curette her, and then let everything quiet down, and after a period of douches, tamponades in the knee-chest position, multiple cervical puncture, etc., do a trachelorrhaphy on tissues that were well prepared. I have never seen such results as these older men obtained. I have patients under my care operated on twenty-five and thirty years ago, and you could never tell that these women had ever borne children. The result of this preliminary treatment was that they did not do as many destructive operations as we now do.

In our clinic, before operating on a lacerated, hypertrophied, everted and eroded cervix, the patient has a course of local treatment, which consists of douching, destruction of the cysts by multiple puncture, iodinization of the cervix and vault, and tamponade in the knee-chest position. The patient is instructed to return every other day, placed in the knee-chest position, the vaginal pack removed, the vagina cleansed, and then repacked in this position. In this way we maintain the plane of circulatory equilibrium and the cervix that was large and edematous, will, in a couple of weeks' treatment, be reduced in size, and cured of its infection. Operation then results in primary union, because we are working in healthy tissue.

An interesting observation made about the labors occurring in those cases operated by tracheloplasty, and low amputation, was that they could be divided into two classes, very rapid and very slow. The labor that was very rapid was always preceded, during the last weeks of pregnancy by a two or three finger

dilatation of the cervix. In other words—the cervix was more or less prepared before labor began. In the other class where there was dystocia, we found a rigid cervical cicatrix which never dilated prior to labor, and was slow to dilate then, particularly so if the membranes had ruptured.

Regarding the toxic influence of infection of the cervix, brought out by Dr. Anspach, our observations have been exceedingly disappointing. Our surgeons and orthopedic surgeons, are prone to refer to us cases of arthritis, supposed to be due to cervical infection. I am frank to say that I have never seen a case of arthritis improved by anything that we have done for the cervix. Dr. Norris referred to the importance of the intermediate repair of the cervix during the early stage of the puerperium. Some few years ago Dr. Hirst suggested to me his method of intermediate repair. Consequently, for the past three or four years I have been having all of my multiparae come into the hospital for their confinements, and on the seventh day, have done an intermediate repair with the most satisfactory results.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING ON JANUARY 4TH, 1923

The President, Dr. Stephen E. Tracy, in the Chair

Dr. George M. Laws reported **Two Cases of Vesical Calculus Consequent upon Cesarean Section.**

Case I.—Mrs. F. M., age twenty-nine years, was referred in June, 1921, with the history of a cesarean section in September, 1918. Three months later there developed burning on urination and constant pain in the bladder during the daytime, made worse by walking, relieved by going to bed. She had passed blood, several small stones, and about ten silk sutures through the bladder, the last one about three months before examination.

Pelvic examination showed no gross lesion; x-ray was negative for stone, the urine contained pus and blood, the cystoscope revealed a flat calculus near the left ureteral orifice which seemed to be adherent to the base of the bladder, diffuse cystitis, and a few small superficial ulcers. The calculus felt soft between a sound in the bladder and a finger in the vagina.

We concluded that the interrupted silk sutures employed for closing the incision into the uterus had been from time to time expelled through the bladder. Operation, June 21, 1921, at the Presbyterian Hospital, by the suprapubic route. The calcareous body was found detached and removed; a superficial ulcer in the trigone at the site of its former attachment was curetted and a search made for the opening of a sinus but none was found. The bladder wound was closed around a drainage tube, a cigarette drain was placed in the prevesical space and a selfretaining catheter passed through the urethra. Irrigations were done daily and the patient left the hospital eighteen days later with the wound healed and the urine fairly clear. In reply to follow-up letters she says she was well for nearly a year and then passed another suture and at present has pain in the bladder and voids about every two hours, but has seen no more stones or blood.

Case II.—Mrs. I. C., aged thirty-two years, was referred July 7, 1922, with the history of a cesarean section in August, 1920, followed a month or two later by urinary symptoms. First there developed frequency and poor bladder control, later burning on urination and pain in the urethra. For several months she had

had so much pain on walking that she was practically confined to the house. There had been hematuria and interruption of the urinary stream for several days. A calculus was passed a few hours before examination, but without relief of symptoms.

Pelvic examination showed no gross lesion. The cystoscope showed a stone lying behind the trigone, a moderate grade of diffuse cystitis and a patch of granulation tissue at the fundus of the bladder in the mid-line that suggested the orifice of a sinus. Suspecting this stone of having a nucleus of silk, the one already passed was secured and upon removing the adherent blood the ligature was found.

The patient was admitted to the Presbyterian Hospital and operated upon July 15, 1922. I decided to remove the stone by litholopaxy if it should be found free in the bladder, by suprapubic cystotomy if fixed or adherent to a sinus. Owing to the small bladder capacity it was rather difficult to establish this point. Under ether, by cystoscopy in different positions of the patient, the calculus was proved to be free and was then crushed with the lithotrite until the silk nucleus was felt between the jaws. Then the instrument was withdrawn and the ligature thereby recovered. Most of the fragments were washed out with the Bigelow evacuator and the remainder were passed as was demonstrated by inspection before the patient went home, seven days after operation, she has remained well.

These patients had been delivered by the classical cesarean section and perhaps a dozen interrupted silk sutures were used in each case to close the uterus and neither patient found any of them passing out *per vaginam*, as occasionally happens. I do not think they constitute a serious indictment of nonabsorbable sutures in cesarean section, because they are the only instances of the kind known in the large series of the obstetrician who operated upon them and I have not seen reports of any similar cases.

DISCUSSION

DR. EDMUND B. PIPER.—I can report a case in which catgut instead of becoming prematurely absorbed never became absorbed. Following an operation for cesarean section, the patient had a stormy convalescence and on the tenth day passed by vagina the whole of the deep continuous stitch with the myometrium. When she was discharged she was warned never to fall in labor with any subsequent pregnancy, our plan being to do elective section. A year or so later, I walked into the clinic and found Dr. Hirst operating and upon inquiry, he smilingly replied that this was a case of mine with a subsequent rupture of the uterus. I was fortunately able to show him on the original record where this woman had been told that any subsequent labor would cause a ruptured uterus. Mishaps in the line of too rapid absorption and *vice versa* are liable to occur where catgut is used, but on the whole we feel that this is the wiser method of closure. However, we still use Pagenstecher thread for stay sutures in classical section.

DR. EDWARD A. SCHUMANN.—In connection with this discussion, Dr. Davis at Jefferson uniformly uses a series of heavy silk stay sutures. I have had occasion in the last few years to do hysterectomy in three cases following cesarean section in which Dr. Davis had used this method. These particular three cases had healed without infection in the first cesarean and all three uteri were subjected to serial sections about the scar and in none of them was a single strand of this heavy silk discovered. The interval in each was a considerable number of years. The interesting point is what became of the silk? We know it is nonabsorbable and I take it the silk migrated along the lymphatics and went out by vagina during a menstrual period.

DR. GEORGE M. LAWS reported a case of **Uretero-vaginal Fistula and Renal Calculus Following Ligation of Both Ureters.**

Mrs. R. M., age fifty years, came for treatment of a vaginal urinary fistula in October, 1916.

In 1901 the right tube and ovary were removed by abdominal incision. In 1910 she had an abdominal panhysterectomy for cancer of the cervix. The next day the incision was reopened because of complete anuria due to accidental occlusion of the ureters, but neither the patient nor her family physician knew what was done at this operation. For six days urine flowed from the wound, then the wound closed and urine came out through the vagina and has done so ever since except for several periods of a few days or weeks, though most of the urine is voided naturally. She has had attacks of left renal colic and has, from time to time, passed calcareous particles. The symptoms of cystitis are always present.

Urinalysis: sp. gr. 1016, acid, faint trace of albumen, no sugar, moderate number of epithelial and pus cells.

Examination showed an opening at each angle of the vaginal vault which would admit only the tip of a small probe. The one on the right side was draining freely but no urine was seen to come from the left side. Cystoscopic examination at the Presbyterian Hospital showed a chronic inflammation of the bladder with fairly normal ureteral orifices in normal position. The ureteral catheter passed readily up the right side and collected clear urine, but on the left side it met an impassable obstruction 4 cm. above the ureteral orifice and collected cloudy urine. Indigocarmine given intravenously appeared first in the vagina in six and one-half minutes, immediately afterward through the right catheter, then on the left side. A few days later an attempt was made to dilate the stricture in the left ureter but without success.

On these findings I supposed that the ureteral opening of the fistula was on the same side as the stricture of the ureter and the infected kidney, and advised nephrectomy, provided further examination should confirm this supposition and establish the functional capacity of the right kidney. Kelly and Burnham (Diseases of the Kidneys, Ureters and Bladder, 1914, ii, 436) state that the fistula, when the opening is vaginal, usually lies on the affected side, but not always. To make sure, the patient must be put in the knee-breast posture and the ureteral orifices inspected and catheterized. If the catheter passes freely up one side and enters but 3 to 5 cm. of the other, this determines the affected side. The chief reason for reporting this case is that it is an exception to the rule quoted.

Five years later the patient decided to accept the advice given so I sent her to the Presbyterian Hospital in February, 1922, to complete the examination. There had not been much change in the local condition except that the vagina was somewhat ulcerated and incrusted with urinary salts. The urine was alkaline and loaded with pus and phosphates. The left kidney was tender. Urine collected by the right ureteral catheter was clear, abundant in quantity and there was no obstruction. A colored solution injected through this catheter appeared in the vagina, not in the bladder, thus proving that the opening of the fistula was in the *right* ureter. Obstruction in the left ureter was met at the same point as at the former examination and purulent urine was collected from the left side. The patient was fat, her blood pressure was 200 mm., and she had a large incisional hernia. An x-ray showed on the left side of the kidney pelvis a number of nodules upon the outer edge, probably due to calcareous material in pelvis and kidney substance,—nothing in line of ureter which might be stone. Phenolsulphonephthalein test with the bladder urine gave 12 per cent and 15 per cent, in two hours. With these findings operation for the fistula was not advised.

A few days ago I obtained further information from the record in the hospital where the operation was performed, through the courtesy of one of its medical officers. The notes are not as complete as one might wish but the operator is dead. The pathologic report was epithelioma of the cervix. The operation was pan-hysterectomy, June 4, 1910. ''No lymph glands removed except those on each side of the cervix, no visible extension of malignancy to surrounding tissues. Reopened the following day for relief of ureteral obstruction. The right kidney was distended, the left small. One ureter was kinked (vesical vessels were ligated on each side, thus acting as a constrictor to the ureter). Two catgut ligatures were around the left ureter. The bladder was incised anteriorly and unilateral catheters were passed a short distance into the orifices. The sixth day after operation a slough of the right ureter was passed *per vaginam*. The right ureter sloughed close to the bladder and a pocket was formed on the right side of the bladder and urine found its way through the abdominal incision. By the eleventh she ceased to pass urine through the abdominal wound, it passing through the vagina, by the twenty-fourth passing through the bladder. Streptococci found in urine. Home July 31 with ureterovaginal fistula.''

<div style="text-align:center">DISCUSSION</div>

DR. JOHN H. GIRVIN.—In the first or second hysterectomy I ever did, I tied off the ureter and did not know it. Several years later the patient had obstruction of the bowel, was operated on and died. At autopsy this obstruction of the ureter and complete atrophy of the kidney on that side, was found. She had never had any symptoms.

DR. BARTON COOKE HIRST.—I have occluded both ureters twice. First, many years ago, by using the clamp method in taking out the uterus by vaginal hysterectomy. I found a complete anuria after the operation. I was afraid if I took the clamps off she would bleed to death and if I left them she would die of uremia. In fact she became comatose and had uremic convulsions for 36 hours. I then took the clamps off. She urinated freely and eventually recovered. In the last few weeks I am sorry to confess, I tied both ureters. Operating carefully under the best conditions, with good assistants, I nevertheless tied both ureters. From Saturday morning until Tuesday night there was complete anuria. The patient was perfectly comfortable, had no symptoms of uremia and if it had not been for absolute anuria I would not have known there was anything the matter with her. Finally I reopened the abdomen and the peritoneal flaps and cut all the ligatures on the floor of the pelvis. I waited three and one-half days in the hope that the unchromicized gut I always use in the abdomen would soften and be absorbed, but I found the ligatures absolutely firm. I adopted the practice of using plain gut on the advice of the late Dr. Cragin who believed the chromic gut on absorption released chemical reagents that caused irritation and adhesions; whether he was right or not it is evident that plain gut will hold long enough to occlude the largest blood vessels. There was no hemorrhage from the ligated vessels after the ligatures were cut. The woman immediately urinated freely; there was a temporary fistula that closed and the woman left the hospital in three weeks in excellent condition. Hereafter I am going to catheterize both ureters before a Wertheim operation. I have seen Wertheim cut a ureter after doing five hundred of his operations, so that no amount of practice and skill will guard an operator against injury or occlusion of the ureters.

DR. EDWARD A. SCHUMANN.—I confess to having tied ureters in more than one instance. Lately, I had a difficult panhysterectomy and conceived what I thought was an original idea of injecting, intramuscularly, indigo-carmine after

the broad ligament was fairly well incised, it being my thought that the dye might show through the coats. In that case it did. The ureter was clearly outlined, lying at the bottom of the broad ligament. In this particular case indigo-carmine was introduced after the abdomen had been opened and intestines packed away.

DR. STEPHEN E. TRACY.—Some years ago I had an experience with a radical operation for carcinoma of the cervix uteri. The ureters, or rather structures we took for the ureters, were dissected out, carefully traced down to the neck of the bladder, laid aside and the uterine arteries were ligated, and a wide dissection of the parametrium was made. As no urine was obtained from catheterization in eighteen hours after operation, the patient was prepared for catheterization of the ureters. A catheter was passed up one ureter 4 cm. and up the other only 3 c.c. It was evident both ureters were ligated and the patient was sent immediately to the operating room. When the field of operation was re-opened both ureters were found distended above the ligatures which were promptly removed. As the patient was in good condition we took the opportunity to determine what structures had been mistaken for ureters. As the supposed ureters were traced down to the neck of the bladder at the time of operation, we traced them upwards and found that they terminated on the anterior branch of the internal iliacs. They were obliterated hypogastric arteries the size of the average ureter, but were situated a little higher up and nearer the side of the pelvis than are ureters. The patient made a good recovery. Since that experience, when we dissect out a ureter, to make sure of the diagnosis, we follow it upward over the bifurcation of the iliac artery. On three subsequent occasions when dissecting out a ureter, we have picked up an obliterated hypogastric artery. The mistake was discovered as soon as they were traced upward over the iliac vessels.

In one of my early radical operations for carcinoma of the cervix the side of the left ureter was pinched with forceps. A necrosis followed and twelve days later a uretero-vaginal fistula developed. The fistula closed in two weeks only to break down two or three times and then gave no further trouble. In July 1922, the patient was reported in excellent condition, over thirteen and a half years after the operation.

That a ureter can be obstructed for several days and the kidney recover its function there is no doubt. I have had experience in two cases. Mrs. X. was admitted to the Hospital one morning after an attack of colic during the night. Cystoscopic examination showed there was no urine coming from the left ureter and a catheter could be passed only as far as the brim of the pelvis. No indigo-carmine nor phenolsulphonephthalein came through in an hour. Repeated cystoscopic examinations at two day intervals gave the same results. As Barney's article had been read a few months before, it was decided to wait what he claimed to be a safe limit—ten days. On the ninth day there was complete obstruction and the patient was ordered to be prepared for operation the following morning. During the night she had an attack of colic. Cystoscopic examination the next morning showed a calculus in the bladder. A phenolsulphonephthalein injection a few days later showed that the output from the left side was equal to that of the right.

In the second case a large calculus 5 cm., in length by one cm., in diameter was protruding slightly through the ureteral orifice causing complete obstruction. The calculus could not be dislodged with a pair of forceps through an operating cystoscope. On the fourth day the calculus was extracted through a suprapubic cystostomy. The kidney fully recovered its function.

DR. HERMAN J. BOLDT described the **Modified Interposition Operation Originally Devised by Christian Kielland, Christiania, Norway.**

This modified interposition operation has for its purpose the placing of the uterus, in its entire length, on the anterior vaginal wall in a straight line, parallel to the vaginal axis, and the narrowing of the entire vagina.

The vaginal portion is pulled forward and upward, so that the posterior surface of the prolapse presents itself to the operator. On this surface, beginning at the cervical opening, incisions are made from 6 to 8 centimeters in length, diverging downward, and excising at the time a wedge of the posterior cervical lip. The base of the wedge should be scant, 0.5 cm. wide, depending on the size of the portio. The flap is separated from above downward, not cut off, but placed beneath the retractor. The vaginal mucosa beginning at the edge of the incision on either side of the portio vaginalis and cervix, must be separated from the underlying structures, starting with a pair of bent, blunt-pointed scissors and continuing with the finger, until the finger may surround the cervix half way or slightly farther, and to within about three-fourths of a centimeter of the terminal of the portio vaginalis. At this point the scissors must be used, care being taken not to perforate the mucosa. The undermining of the wedge-shaped incision is necessary for the subsequent inversion of the cervix and the portio. The posterior wound surface is now united a length of 6 to 8 centimeters, starting at the posterior lip, but the mucosa only; the underlying structures must not be included in the suture.

The vaginal portion of the cervix is now drawn downward, and the anterior surface of the prolapse is operated upon. An oval flap is resected, beginning about 0.5 c.m. beneath the urethral orifice and terminating at the cervical opening. A small wedge is likewise excised from the anterior lip, the size depending upon the size of the portio vaginalis. The excision must be sufficient to make the portio somewhat conical for the purpose of inversion. On either side of the prolapse there should remain about two finger breadths of mucosa, in order to retain a medium sized vagina. On the anterior surface the mucosa (after excision of the flap) should be separated about a finger breadth and a little more toward the urethral terminus, because this part of the mucosa is destined to cover the anterior surface of the uterine body. These edges are now grasped with two pairs of mouse-toothed clamp forceps about 3-5 cm. on this side of the upper wound terminus, to enable the operator more readily to control them so as to unite the mucosa in front of the uterine body later on.

The bladder is now separated from the cervix and pushed upward, though it should not be separated as far laterally as is usually done in the interposition operation; the Luschka bladder pillars should be left *in situ*. When the vesicouterine plica has been opened, and the bladder catheterized, the body of the uterus is brought forward through the opening. The tubes are ligated. (I prefer to excise a part of each tube at the uterine cornu.) The bladder peritoneum is attached to the posterior uterine surface at the corpocervical junction. Kielland does not con-

sider it essential to sew the peritoneum to the uterus, since this may cause a slipping back of the body into the peritoneal cavity, thus necessitating bringing it out again.

A gauze strip is placed down to the suture, between the bladder and the uterus and brought out at the upper wound opening as a drain. The anterior vaginal wound may be united by one of two methods: (1) A continuous suture of the vaginal wound, including the corpus uteri and the cervix in the suture, beginning at the upper angle of the wound; the first suture should not be placed higher than the round ligaments, not at the summit of the fundus or on the posterior surface. (2) In the case of larger prolapsus, it is more convenient to make the suture in two stages, beginning at the lip of the cervix and sewing upward to above the corpocervical junction, where the suture is discontinued. The cervix is included in the suture. Now the cervix with the portio vaginalis may be inverted into the vagina. This is accomplished by pressing one finger on the portio, while one pulls with the other hand on the posterior vaginal flap or on the knotted catgut suture left when working on the posterior surface. When this has been done the distal half of the vagina has been formed in the depths of this vagina, one no longer feels a portio vaginalis, but only the anterior lip and the cervical opening. The posterior lip has been obliterated to touch.

If the corpus uteri is still protruding between the vaginal wound edges, it is pushed back to its future position beneath the bladder and the vaginal edges are brought forward in front of the corpus. If there is too much vaginal mucosa for a moderately taut covering of the corpus, as much of the tissue may be excised as is necessary. The uniting of the edges should be from above downward. These stitches also take in the uterine musculature, at least every second stitch. The operation is completed by doing a pelvic floor plastic. A Hegar flap is extirpated, continuing the incision made for the posterior flap on the posterior vaginal wound, including the corpus uteri and the cervix in the suture, beginning at but bends into a point toward the anus. The underlying (venous) tissue is not taken in by the sutures in the Kielland operation; only about the carunculae myrtiformis to the perineum the stitches penetrate into the tissues more deeply on the lateral wall. The levators are not sutured except in case of rectocele. The perineum is united with somewhat deep silkworm sutures, or fine catgut and Kielland places a glass tube 3 to 4 cm. in length, before making the last suture, and fastens it with the last stitch. I have found no necessity for this. The vagina is tamponed to the external orifice and a T binder is applied.

This operation in suitable cases is not difficult from the technical point of view. Kielland states that in more than 150 such operations he has not seen one recurrence, and has used this technic since 1911.

DISCUSSION

DR. H. N. VINEBERG.—I do not suture the bladder to the posterior wall of the uterus as I think it traumatizes these structures. A second point of importance is that in passing the first suture to take a good bite of the subpubic ligament in the stitch and go through the uterus, being careful not to pass the first suture as high as the attachment of the round ligament. If the first suture is passed through the uterine wall too high, the uterus bulges too much into the vaginal canal.

I always do a high amputation of the cervix so there can be no anteflexion, which is better than incising the posterior lip and leaving the anterior lip. Of course one only does this operation in women who do not expect to bear children. In cases in which the uterus is considerably enlarged I do a high amputation of the body of the uterus and use the stump of the cervix for interposition. This has proved, at least in my hands, very much more satisfactory than what I had

previously been doing, that is reducing the tip of the body by excising a wedge shaped mass from the anterior wall or fundal arc.

DR. ARTHUR STEIN.—I have performed this operation and I do not think that it is going to stay. If we use any interposition operation at all, I think fairly good results are to be obtained with the one devised by Schauta-Wertheim-Watkins. However I personally think that none of the interposition operations are really good. To my way of thinking, in cases of total prolapse we should do a plastic operation in combination with a high intraabdominal fixation of the uterus. The Kielland operation did not impress me as being a very simple one and only a few cases outside of Kielland's have been reported. I therefore feel that although Kielland has operated some 150 cases with good results, we must wait for reports from large clinics before we decide to embody this procedure in our armamentarium.

DR. HARBECK HALSTED.—I agree with Dr. Stein that the interposition operation is going to pass out. I wonder what bladder symptoms Kielland had following this operation? In cases in which the interposition operation has been done I have seen many bladder symptoms. If the uterus is a little too far down, it holds the urethra open and interferes with the trigone, sometimes causing strictures of one or both ureters. I believe that in this operation the uterus is usually brought too far down. It seems to me that Dr. Vineberg's method of cutting off the body of the uterus and using the stump of the cervix is preferable.

DR. VINEBERG.—I want to say that I have been operating on private patients for fifteen years by the procedure I described, and if the patients had had bladder symptoms I surely would have given up the operation. They do not have bladder symptoms; on the contrary, by doing the operation in the manner I described, and sometimes putting in an extra suture or two in the vicinity of the sphincter dribbling or incontinence from which the patient suffered was relieved. I can well understand the bad results with the interposition operations, for I have seen more bad surgery in interposition operations than in any other type of operation.

DR. MAX ROSENTHAL.—Kielland's operation strikes me as simple and I have seen Kielland direct the operation. The old Wertheim and Schauta operation has been given up and the modified Wertheim shows a high mortality and a high percentage of morbidity. Kielland claims good results and says that he never does a perineorrhaphy.

DR. BOLDT (closing).—For Dr. Vineberg's information I would say that from the anterior lip of the cervix a wedge is excised similarly as from the posterior lip. The vaginal portion should be conical in order to permit one to do the inversion. When we have a large portio vaginalis, the wedge must be larger to make a conical portio.

As to the bladder symptoms, I had, as I remember, only one case in which the bladder symptoms remained for any length of time. Usually they disappear in three or four days. There is some irritation about the trigone, but the patients have not complained of symptoms, except slight frequency of urination which soon passed away.

As to the placing of the suture, it ought not to be higher than the origin of the round ligaments, on the anterior surface. In one patient coming under my observation after an interposition operation performed by another operator, the first suture had been placed at the fundus, with the result that there was a bulging fundus, so that it was necessary to do another operation.

The Kielland operation is not an operation for all cases of procidentia, but when indicated it is not difficult to perform. In doing the customary interposition operation, I also do a high amputation of the cervix, and if the uterus is too large I take out a piece of the fundus, or a wedge from the whole uterus. I do not recall an instance in which there was a recurrence. If the operation is adjusted to the condition, and not the condition to the operation, I have been able to get good results.

Dr. MEYER R. ROBINSON read a paper entitled **Folliculoid Cancer of the Ovary with a Consideration of Ovarian Neoplasms in the Light of Histogenic and Morphologic Correlations.** (See page 581.)

DISCUSSION

Dr. I. C. RUBIN.—The subject presented is still debatable ground. Dr. Robinson deserves a great deal of credit for having again brought up the subject and for having gone into the histogenetic phases. There are four types of epithelial structures that we must consider: (1) The germinal or surface epithelium; (2) The epithelium of the graafian follicles; (3) The epithelium of the medullary cords; (4) The epithelium of the epoöphoron or parovarian ducts in the mesovarium. Dr. Robinson agrees with Robert Meyer that of all the possibilities presented by the epithelium in these various locations, it is most probably the epithelial clumps of granulosa rests that have invaded the depths of the ovary and remain there for a long time which offer the basis of the carcinoma. If we deal with the Cohnheim theory then we may assume that these rests of the epithelium, embryonal in character, may at some time form the basis of carcinoma. The term "folliculoid carcinoma" is simply a descriptive term, rather than implying that the follicular part comes from the graafian follicle. What Dr. Robinson has described suggests still another possibility, a new histogenetic type described by J. A. Sampson in a remarkably thorough and convincing report. Sampson has shown by a study of 137 cases, with most careful pathologic examinations, that tubal epithelium may be dislocated and become implanted on the ovary, uterus, peritoneum, appendix, etc. Dr. Jacobson, of Sampson's Laboratory has taken bits of endometrial epithelium and implanted it in the serosa and has produced implantation adenomata or cystadenomata. I think we can accept these adenocystomata as arising from implantation of tubal epithelium. They become invasive and may lodge within the parenchyma of the ovary for a long time. Instead of calling upon a heterotopy to explain the carcinomatous conversion, we have a tissue closer at hand to serve as a basis for the malignant degeneration. In other words we cannot escape the impression that the adenocarcinoma of the ovary may arise from implants of the endometrium or tubal epithelium. If we add to these four possibilities mentioned by Dr. Robinson this new idea of Sampson's, we have all the sources from which the folliculoid ovarian carcinoma may emanate. Dr. Sampson states that he has two cases of carcinoma which he believes have this origin. We are indebted to Dr. Robinson for bringing this up, for while it does not settle the question it has aroused our interest in this subject dealing as it does with a unique pathologic lesion in one of the most complex organs in the body.

DR. EMIL SCHWARZ.—The question of histogenesis is difficult to decide upon without close examination of the microscopical slides. I should like to ask Dr. Robinson if the centers of the cylindroid structures were blood vessels.

DR. ROBINSON.—Yes, they were.

DR. SCHWARZ.—Then this corresponds to the description of cylindromata given by Billroth. We might assume that this carcinoma is derived from the follicular epithelium, although connecting links have not been established between the two histological formations. Dr. Robert Meyer assumed that the origin of these tumors was from stray medullary tubules or strands very often found in the ovaries of adult women, since the fully developed follicular epithelium cannot be regarded as a source of such tumors, according to all experiences in oncology. It is, however, important to know that such tumors, after a careful search, sometimes show portions with distinct papillary structures, thus revealing their identity with other tumors of the papillary type. We are, in most cases, used to the exophytic growth of epithelium while these tumors show an endophytic proliferation. To a certain extent it is irrelevant whether histogenesis assumes the derivation from the germinal epithelium, as in the case of papillary tumor, or from medullary strands, as Dr. Robert Meyer and Dr. Robinson assert since both epithelial types are embryologically identical. There seems to be the one difference that the period of development of the mother epithelium is different.

DR. G. L. MOENCH.—Despite all work done so far we still know practically nothing at all of the histogenesis of ovarian tumors. As an example I may cite the Zeitschrift für Gynekologie and the Beitraege zur Geburtshilfe und Gynäkologie for 1915. In the former journal Bauer ''proved'' by serial sections that pseudomucinous cysts came directly from invaginations of the surface epithelium of the ovary. In the second periodical Lahm, Kehrer's assistant in Dresden, ''proved'' also by serial sections that these tumors had their origin in Walthard's cell rests. We must avoid judging the origin of a tumor from its form alone. Again we must not stress a palisade or radial arrangement of the cells too much as we see it around blood and lymph vessels or on the periphery of alveoli in adenocarcinoma. Gottschalk years ago described a perithelioma of the uterus. Perithelium, however, has not been proven to exist in the uterus and an exact duplicate case in my own experience some years later proved to be a carcinoma on serial section. The peculiar structure was simply due to the fact that the tumor was growing around lymph-vessels or perivascular lymph spaces. I have seen two cases of what at first appeared to be folliculoma ovarii and one of these proved on closer examination to be nothing more than a carcinoma growing around lymph channels. The coagulated lymph and degenerated cells simulated follicular structures to some extent. We must not forget that the ovary is the exact homologue of the testicle and originally develops the same excretory system of tubules. The process of extrusion of the ovum has however become reversed and occurs by means of rupture of the follicle. The whole excretory apparatus hence becomes useless and we have a lot of ''dead'', that is, functionless tissue, in the ovary from any part of which a tumor may develop. I do not believe, however, that, for the present at least, any one can tell which type of tumor is derived from any particular part of the ovarian structures. One thing only seems certain and that is, as Dr. Robinson has said, that the mature follicles and granulosa certainly do not develop into these folliculomata. Perhaps further research may show that these tumors are not really histogenetically different from other tumors of the ovary but merely an atypical form of some other well known tumor of frequent occurrence.

DR. ROBINSON, (closing).—Dr. Rubin's hypothesis, based upon the recent work of Sampson, that folliculoid cancer of the ovary may also have an endosalpingial or endometrial genesis, is hardly acceptable. A critical study of Dr. Sampson's contribution has convinced me that his adenomatous formations differ in no way from those that I have described in 1913 in my study of ''Adenomyosalpingitis'' and that most of them or all of them are secondary to inflammatory processes. I have often seen such formations in cases of perioophoritis. Furthermore,

in order to correspond to the Sampson theory, folliculoid cancer ought to start from the surface of the ovary where the uterine or tubal epithelium is first deposited. In my specimen the ovarian cortex was well retained and was free from any tumor invasion; the new growth has chiefly involved the deeper portions. Nor are there any other morphologic evidences in folliculoid or cylindroid cancer to link it to the Sampson theory, for in adenomatous formation we see an invasion of the normal stroma by these glands, sparsely in the beginning and more extensive later on. Here the normal tissues are replaced by an excessive proliferation of round epithelial cells and only here and there do some of these cells group themselves into gland-like forms, and these cells bear no resemblance to the endometrial or the endosalpingial epithelium.

Dr. Schwarz's endothelial suggestion would be acceptable if our specimens would show any intravascular or extravascular endothelial proliferations. While the connective tissue septa do show an abundance of capillaries, they do not in any way form angioplastic tumors and the endothelium remains normal.

I did not expect unanimity on this question of the histogenesis of folliculoid cancer of the ovary. This chapter, as well as the one on ovarian tumors in general will undoubtedly remain open for many years to come, but what I wish to impress by this study, and by the rest of my paper, which due to lack of time I did not read, is that in discussing the pathology of ovarian tumors we must always attempt to correlate histogenesis with morphology, and not permit the latter to sway our pathologic diagnosis.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Selected Abstracts

Etiology and Treatment of Accidental Hemorrhages

Clemenz: A Critical and Historical Investigation of the White Necroses of the Placenta. Zeitschrift für Geburtshilfe und Gynäkologie, 1922, lxxxiv, 758.

The author considers the term "white infarct of the placenta" a misnomer which should be abolished and replaced by the correct descriptive term "white necrosis of the placenta". His own work in 1894, abundantly confirmed by the extensive researches of Hitschmann and Lindenthal and of other authors, proves that the condition bears no more relation to infarct formation than it does to inflammatory reaction, as in the discarded placentitis theory. These researches have shown that the villus epithelium and villus stroma are not nourished by the fetal circulation but rather by the intervillous maternal blood. In nonluetic cases, with so-called infarcts, it was never possible to demonstrate the peri- or endarteritis of the fetal vessels to which this "infarct" formation has been ascribed. The condition is really a necrosis which is secondary to the clotting of maternal blood in the intervillous spaces. This clotting may be initiated by fibrin deposits upon villi with localized epithelial defects, and is aided by the slowness of the blood stream in the placental circulation. For these reasons, the author advocates the change in nomenclature and the interpretation mentioned above.

Margaret Schulze.

Rucker: Apoplexy of the Placenta. Southern Medical Journal, 1921, xiv, 318.

The term apoplexy is applied to those infarcts of sudden onset and rather constant clinical signs in which there is usually actual hemorrhage. They are either red or pink in color. Large infarcts of any kind may lead to the death of the fetus, or, at least retard its development, because they decrease the area of functionating placental tissue. Infarcts may be the cause of certain cases of ablatio placentae, though in other cases the placenta is adherent.

Rucker believes that the rather sudden rise of blood pressure, unaccompanied by subjective symptoms, and which resists all treatment, is characteristic enough to make the diagnosis. Albuminuria is usually present. Labor often sets in soon afterwards, if not, he advises induction of labor in the interest of the child.

R. E. Wobus.

Talbot: A Clinical Study of the Placenta. Surgery, Gynecology and Obstetrics, 1921, xxxii, 552.

In addition to leaning to the infectious theory of eclampsia, Talbot believes that placental infarcts are the result of hematogenous infection. Their presence, to him, is more positive evidence of a bacteriemia than blood culture. In sup-

port of his theory he reports the case of a patient who had an attack of nonsuppurative appendicitis in the ninth week of her pregnancy, supposedly caused by a tooth abscess. From the shape of the placenta he attempts to show that its configuration was determined by infarcts formed at the time of the appendiceal infection.   R. E. WOBUS.

Frankl and Hiess: Premature Detachment of the Placenta. Archiv für Gynaekologie, 1921, cxiv, 225.

In a series comprising 35352 births after the 28th week, were found 34 frank cases of premature detachment of the normally situated placenta (0.096%). Classified as to severity of the hemorrhage, 16 cases were mild and 18 severe, the latter yielding 9 maternal deaths. In 2 cases the hemorrhage was entirely internal; in 9, mostly internal; in 21, the internal and external hemorrhages were about the same; in 2 cases, nearly entirely external.

The cases of internal hemorrhage are marked by definite shock and high grade anemia, which may come on very suddenly, and by tenderness of the uterus with a woody consistency of part or all of that organ, hindering palpation of the fetus. A swelling forms at the site of separation; this increases the tension on the membranes if unruptured. The picture is often obscured by that of a toxemia, even eclampsia, which often accompanies it. Of the 34 cases reported, 19 had albuminuria, and of these, 6 had more or less toxicosis. Autopsy on a primipara with typical eclampsia showed bloody suffusion of leptomeninges, several circumscribed soft foci in the lenticular nucleus, edema of the brain, small hemorrhages in the renal pelvis and cortex, hemorrhagic hepatitis, fresh hemorrhages under the endocardium and the serosa of the uterus, some bloody fluid in abdomen, massive hemorrhages in both parametria.

Autopsy on a 25-year old v-para with nephropathy showed a markedly dilated uterus suffused with blood, with ¼ liter of blood in the abdomen; parenchymatous and fatty degeneration of myocardium, kidneys and liver, and marked swelling of the spleen.

From their own cases and those of 16 others, Frankl and Hiess are convinced that these figures establish with certainty the high frequency of albumen in the urine with premature separation of the placenta.

Infiltration of the uterine muscle with blood hinders contraction and increases the liability to fatal hemorrhage; the muscle is further injured by over-stretching over the hematoma. In eight cases the writers were able to study the uterus removed at autopsy, and they do not confirm that the cause of premature detachment is demonstrable histologically. Nor did the histologic examination of the 34 placentae add materially to what has already been described.

The writers differentiate 3 kinds of causes: (1) mechanical (short cord, etc.); (2) premature dilatation of the vessels of the spongiosa, causing rupture of the placental septa; this accounts for cases with hydramnios, (and twins) and cases without demonstrable cause, and probably most cases of gross trauma, Basedow's disease, and circulatory disturbances; (3) abnormal permeability and friability of the vessels, particularly in nephritis and toxicosis.

Treatment depends on the severity of the hemorrhage. Of the 16 mild cases, 9 terminated without interference. Podalic version and extraction were employed 4 times. In only one case, with complete dilatation, were the membranes ruptured. Of the children, 13 survived birth, one however only two days. All the mothers survived, two with fever and one with toxic symptoms lasting for a short while after delivery.

Among the 18 severe cases was one spontaneous delivery of a macerated fetus

dead from a severe antepartum hemorrhage. In 2 cases the membranes were ruptured, once in preparation for further surgery; in 4 cases, podalic version and extraction, and in 3 of these, perforation of the aftercoming head. In 4 cases (including one hydrocephalus) the presenting head was perforated. In 7 cases, vaginal section with perforation of the head in 3. In one transverse presentation, decapitation. All 18 children were dead. Nine mothers died, 3 from atony and 4 from the combined effects of the hemorrhage and a coexisting toxicosis. Of the nine surviving mothers, 3 had fever after delivery.

No principle of treatment applies to all cases except that when hemorrhage is severe, delivery must be prompt. In toxic conditions the hemorrhage often occurs long before dilatation. If the case cannot be removed to a hospital, instrumental dilatation is indicated. The use of bags is not an equivalent measure because while awaiting dilatation the hemorrhage increases, and the infiltrated uterine muscle does not contract efficiently and is prone to rupture. When hospital facilities can be had, treatment of choice depends on dilatation. When version is feasible it is indicated. Perforation for a dead child, high forceps for a living one, come into consideration. If dilatation has not occurred, one must choose between vaginal or abdominal section. Vaginal section allows the removal of an atonic uterus without technical difficulty, but the writers' unfavorable experience with it leads them to incline toward abdominal section, particularly in view of the difficulty in recognizing per vaginam a rupture of the uterus. In cases of severe hemorrhage with atony the treatment of choice is abdominal section and hysterectomy.

RAMSAY SPILLMAN.

Willson, P.: Uteroplacental Apoplexy in Accidental Hemorrhage. Surgery, Gynecology and Obstetrics, 1922, xxxiv, 57.

Willson reviews 67 cases of this condition reported in literature and adds a case of his own. Eighteen of the patients were primigravidae, the remainder being multigravidae. While some cases occurred as early as the seventh month, the majority were at or near term. In 86 per cent of the cases, urinalysis showed albumen in greater or less amount, while some showed casts or red cells in addition. The average blood pressure in these cases was 182. Other evidence of toxemia was present in many of the cases, six being described as eclamptic. In 68 per cent there was frank bleeding, in the rest it was concealed, at times extending into the broad ligaments, the tubes, and in some cases in various directions under or upon the peritoneum. The mortality rate was 55 per cent.

Pathologically, the uterus is comparable to an ovarian cyst with twisted pedicle. The hemorrhage distends the myometrium, tearing the muscle bundles apart. In some places even the fibres may be separated. The hemorrhage is always worse near the fundus, the lower segment being often spared altogether. With the exception of infarcts and the compressed zone corresponding to the area of the retroplacental hematoma, the recorded examinations of the placenta showed an absence of pathology. The lesions in the liver are hemorrhage and acute parenchymatous degeneration. In the kidney, also, acute parenchymatous degeneration was the rule. In two cases where an autopsy was performed on the fetus, extensive hemorrhages into various viscera were noted.

Willson concludes that uteroplacental apoplexy is caused by the inundation of the uterine wall with a toxin of the nature of a hemorrhagin, liberated from the placenta and, naturally, producing its maximum effect at the site of its absorption and greatest concentration. He believes that accidental hemorrhage is usually a manifestation of the same process, and that the significant fact, clinically, is the damaged state of the uterine wall, which tends to cause both intraabdominal and

postpartum hemorrhage. In severe cases, with undilated cervix, he advises cesarean section followed by hysterectomy.   R. E. WOBUS.

Gordon, Ley:. Accidental Hemorrhage. Clinical Journal, 1921, 1. 689; Journal of Obstetrics and Gynaecology of the British Empire, 1921, xxviii, 69.

In 50 cases of accidental and retroplacental hemorrhage, 82 per cent were multiparae. The average parity of the cases was 5.7 pregnancies. Traumatism, the rupture of the sinus circularis of the placenta, fright, cardiac disease, fibroids and blood diseases apparently played little part in the etiology. A short cord could not be a factor, because with a pain uterus and placenta move synchronously with the fetus. Endometritis cannot be definitely excluded as an etiological factor. Syphilis was present in only one of the 15 cases tested for its occurrence. Albuminuria was present in 84 per cent of the cases, the amount of albumen varying from a fine cloud to 15 parts per 1000 (Esbach).

The hemorrhage is probably due to focal necrosis with bleeding into the musculature and decidua of the uterine wall; separation of an area of the placenta opens up sinuses, thus allowing external or internal bleeding.

If the loss of blood is slight, rest in bed with morphia is usually sufficient together with diet and laxatives to rid the system of the toxins. In cases where it is necessary to deliver, rupture of the membranes, applying a tight binder and 1 c.c. of pituitary extract will be adequate. If a great deal of blood has been lost the vagina must also be packed.

In cases of internal bleeding the membranes must not be ruptured, for then uterine pressure is lowered and the bleeding can go on without hindrance. The patient instead should be given morphia, kept warm, and usually in a few hours she recovers enough for labor to commence. When the pains are established, the membranes are ruptured and the case treated like one of external bleeding. If the patient becomes worse abdominal cesarean section must be done and the uterus removed if it fails to react after delivery. In the 50 cases reported the maternal mortality was 6 per cent and the fetal mortality 80 per cent.

A. C. WILLIAMSON.

Snowden: Abruptio Placentae. Journal American Medical Association, 1921, lxxvi, 1066.

Snowden thinks the cause of this condition is a toxemia. He believes the often associated placental apoplexy to be the initial lesion, rather than the cause, as some writers maintain. He advises cesarean section in certain cases, and even hysterectomy in case of doubt as to the contractility of the uterus.   R. E. WOBUS.

Huguet: Retro-Placental Hemorrhage. Revista de Medicina y Chirurgia, 1921, xxvi, 3.

The connection between this accident and eclampsia is of modern recognition. But one paper on this subject has ever been published in Cuba. Of the numerous individual causal factors assigned, many are of the sort found in eclampsia; so that the author assigns a common origin to both conditions, expressed today by the conception of autotoxemia of pregnancy. But alongside of these factors are others purely mechanical, as traumatism and short cord. Older accoucheurs, as Blot in 1849, knew that albuminuria preceded many cases. The high tension seen in the preeclamptic period has been regarded by some as a mechanical factor.

When there is free ante-partum hemorrhage the condition is most commonly described as premature detachment of the placenta. Only in cases in which the blood

is imprisoned beneath the placenta does the term retroplacental or latent hemorrhage appear to be useful. Concealed hemorrhage however, has no necessary dependence on imperfect detachment of the placenta for it has been seen when the separation was complete. Of the author's five cases there was more or less external bleeding in all. Every case presented symptoms which commonly occur in the autotoxic pregnancy.

Eufinger, H.: Fissures of the Uterine Peritoneum in Premature Separation of the Placenta. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lix, 158.

One of the predisposing causes of uterine rupture is premature separation of the normally implanted placenta. A case of abruptio placentae is reported in which were found many incomplete ruptures of the uterine peritoneum and outer layers of uterine muscle. All the cases in the literature in which such ruptures were observed were associated with abruptio placentae. The author's patient at cesarean section was found to have free blood in the abdominal cavity. She died during the operation. Microscopic sections of the uterine wall both through the areas of rupture and areas which were intact showed masses of blood. The modus operandi of these ruptures is as follows: When abruptio placentae occurs in the presence of intact membranes, the mechanical pressure during pains is such that blood is forced into the entire uterine wall, beginning at the placental site where there is a retroplacental hematoma. If the blood infiltration is marked, it continues until it reaches the inelastic and tough peritoneal covering which offers a resistance. Because of its unyielding character, the peritoneum tears in places. Since peritoneal tears with consequent intraabdominal hemorrhage cannot be diagnosed, abdominal cesarean section rather than vaginal delivery is advised for these cases. J. P. GREENHILL.

Shaw: Hysterectomy for Accidental Hemorrhage. Journal of Obstetrics and Gynaecology of the British Empire, 1921, xxviii, 135.

The author suggests that these cases be reclassified for treatment into two groups, contractile and noncontractile according to the condition of the uterus. The former and more common type responds to treatment. Vaginal packing, rupture of the membranes, a tight abdominal binder and the use of pituitrin and ergot are the measures employed in these cases. In the second group, fortunately rare, no treatment is of value and the uterus remains flabby and bleeding in spite of stimulative measures. Cesarean section with removal of the uterus if it fails to contract, is indicated.

Seven cases are reported in only one of which was there a total absence of external bleeding. Six cases were treated by supra-cervical hysterectomy. One received a vaginal hysterectomy (the baby having previously been delivered) because the condition of the patient did not warrant opening the abdomen. Four of the seven cases died. One was moribund when operated, the ligature on the uterine artery slipped in another case.

Pathologically six of the seven cases showed hematoma in one or both broad ligaments. In two cases the hematomas were so extensive that free bleeding had occurred into the peritoneal cavity. On section all of the uteri showed an increase of elastic and fibrous tissue in addition to free hemorrhage into the myometrium. Every case showed an albuminuria of varying degree, definitely associating the condition with the toxemias of pregnancy. Trauma was not a factor in any case. Immediate abdominal operation is suggested for every serious case that does not respond to other measures. H. W. SHUTTER.

Dietrich: **Placenta Accreta or Increta.** Zeitschrift für Geburtshilfe und Gynäkologie, 1922, lxxxiv, 579.

Placenta increta partialis or totalis is a rare condition but is represented by a perfectly definite anatomic-histologic and clinical picture. The author found 19 well described cases in the literature. The etiology of placenta increta is a primary, partial or total atrophy of the uterine mucosa which may be due to too vigorous curettage, to atmokausis, to previous manual removal of the placenta with separation at an abnormal level, to severe endometritis, to exhaustion of the uterine mucosa following oft repeated pregnancies or to submucous myoma. As a result of this partial or complete atrophy of the endometrium, there is an insufficient development or entire absence of the decidua and the chorionic villi penetrate directly into the uterine musculature causing its severe damage or partial destruction. This may lead to uterine rupture with fatal intraperitoneal hemorrhage, either during pregnancy or labor, especially as a result of efforts of expression of the placenta by the Credé method in the third stage. These placentas cannot separate normally since there is no plane where separation may occur, and even a complete manual removal is impossible since the chorionic villi penetrate to within a millimeter or less of the peritoneum. Hemorrhage is extreme, since the damaged uterine wall cannot contract and where the condition is complete usually leads to a rapidly fatal issue. The condition must be carefully differentiated from the adherent placenta due to disturbance in the mechanism of separation, as where the placenta is inserted at the tubal angle, or in a uterus arcuatus, or where there is a placenta membranacea, succenturiata or previa. Here manual removal is usually easy and complete, and is the only treatment required. In true placenta increta, on the other hand, when it is found impossible to find a plane of cleavage or remove the placenta, the uterus should be packed as tightly as possible, and then be removed immediately, to obviate the very great danger of death from hemorrhage.

MARGARET SCHULZE.

Zangemeister, W., and Schilling, F.: **Placenta Cervicalis.** Monatsschrift für Geburtshülfe und Gynaekologie, 1922, lx, 15.

Under the term placenta cervicalis are included cases in which the development of the placenta in part or in its entirety takes place in the cervix. Including the two cases reported by the authors, there are only 38 cases in the literature.

There are two possible ways a placenta cervicalis may arise. First, the ovum may be implanted in the cervical canal, secondly a placenta may develop in the corpus and grow down into the cervix. There is a third small group where the placenta, situated in the corpus, grows down and into the wall of the cervix, which it divides into two layers.

Cervix placentas occur especially in multiparae and in the latter part of the child-bearing period. "Endometritis" plays no part in this condition. Quickly repeated pregnancies may be a factor as they tend to prevent proper closure of the internal os. In many of these cases there is marked dilatation of the cervical canal and the vascular supply is greatly increased. In all cases the implantation of the egg, and therefore the development of the placenta, takes place deep in the uterine musculature. The placenta is very adherent to the muscle and presents extreme difficulty when attempts are made to remove it. There is profuse bleeding due to the enormously increased vascular supply in the cervix and to the lack of retractility which prevents closure of the blood vessels.

In 29 per cent of the reported cases there was no bleeding during pregnancy as opposed to 4 per cent in placenta previa. During the first 4 months there was

bleeding in 21 per cent as contrasted with 6-7 per cent in placenta previa, while in the last two months 29 per cent bled as compared with 52-59 per cent in placenta previa. In placenta cervicalis 55 per cent of the patients reached full term without any disturbances, whereas only about 32 per cent of patients with placenta previa go to term without mishap. Labor in cases of cervical placenta was associated with hemorrhage, but unlike placenta previa the bleeding was not checked so well by rupture of the membranes, insertion of a colpeurynter or internal version. In some cases there was no bleeding at all during delivery. Of greatest importance was the third stage of labor, because in only very few cases could the placenta be delivered without digital aid. Associated with this was severe bleeding, which usually occurred after the placenta was removed due to lack of retraction. The mortality for the cases which terminated during the first six months of gestation was 38 per cent, whereas for the remainder it was 54 per cent. Of the viable children, 31 per cent were stillborn.

The diagnosis is made by finding a lip of the cervix swollen, almost like a tumor, the cervix shortened, the cervical canal narrowed and varicose veins on the portio. On insertion of the finger into the cervical canal, often no placental tissue is found despite preceding hemorrhages. Sometimes an edge of placenta is felt firmly adherent to the muscle at the external os. The fetal head is usually very high up. Delivery in these cases should be by cesarean section, preferably the low cervical. If difficulty is encountered in the removal of the placenta, the uterus should be extirpated. J. P. Greenhill.

Krause: Placenta Previa Cervicalis. Zeitschrift für Geburtshülfe und Gynäkologie, 1921, lxxxiii, 413.

The author describes a case of cervical placenta previa in a 43 year old, in her tenth pregnancy, who had had a manual removal of the placenta in a number of pregnancies and a placenta previa with adherent placenta in the last. The patient died of acute anemia following cesarean section and removal of the very densely adherent placenta. The essential anatomical features were the following: The placenta filled the whole lower portion of the uterus and was everywhere densely adherent to the wall. On the left side it had penetrated into the wall and had split off a muscular lamella of the cervix, which was covered by mucosa showing a partial decidual reaction. There was no decidua anywhere beneath the placenta. Nitabuch's layer rested everywhere directly on the musculature, which contained numerous wandering fetal cells. The fundus showed only a very poor decidual reaction. The author believes the multiparity of the patient, which is found also in most similar cases in the literature, an important factor in the etiology of the condition, since the worn-out uterus no longer forms a favorable implantation site. The therapy is unsatisfactory; cesarean section should always be considered since the wandering of placental villi deep into the musculature and the poor contractility of the uterus favor severe postpartum hemorrhage which may lead to a fatal outcome. Margaret Schulze.

Liegner: The Significance of the Hemorrhage in Placenta Previa. Zeitschrift für Geburtshülfe und Gynäkologie. 1921, lxxxiii, 349.

The hemorrhages in placenta previa are of decisive importance for the fate of the woman and for the time for interference. Hemorrhages during pregnancy cause definite damage to the maternal organism. Active interference should be directed toward the control of these hemorrhages and the prevention of such damage.

More than half, 61 per cent of the author's 113 cases, bled during pregnancy, of

the 41 cases of total placenta previa 30 had bled before the onset of labor. A careful examination of all bleeding patients to determine the diagnosis is most essential, though seemingly frequently neglected.

The greatest danger comes from the severe hemorrhages which occur before medical aid can arrive. The direct risk from hemorrhages during the third stage is considerably less, yet a repetition of hemorrhage after labor, the result of deep cervical tears or of uterine atony, may be decisive in the cases of partially exsanguinated women, or of those whose organism has suffered considerable damage during the pregnancy period. The anemia reduces the resistance of the patient and increases puerperal morbidity and septic infection. The time interval before the patient is fully restored to her normal well-being is often considerably prolonged.

MARGARET SCHULZE.

Hofmeier, M.:   The Treatment of Placenta Previa.   Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lx, 3.

There is very little danger of hemorrhage resulting from the lack of contraction of the lower uterine segment in cases of placenta previa. Of his 206 cases (exclusive of those treated by cesarean section), only five died from hemorrhage which resulted from insufficient contraction. Cesarean section in the hands of Hofmeier gave poor results as evidenced by three deaths in a series of 14 operations. He therefore, favors the other means of treating placenta previa. It is the author's belief that the lower uterine segment is not the primary seat of implantation of the ovum but that the presence of a portion of the placenta near the cervix is due to the widespread growth of the placenta or to a reflexa placenta. Because of this and because of the anatomical arrangement of the blood vessels there is no serious blood loss after delivery, even where there is no active contraction of the lower uterine segment. Only where the placenta has grown into the uterine wall is there danger of hemorrhage. In the latter cases, a Porro operation is indicated. In general, the old methods, namely, tamponade, rupture of the membranes and combined version with subsequent spontaneous delivery are to be practised. However, one may stretch the indications for cesarean section in the interest of the child, where the latter is viable, the cervix closed and the placenta covering the internal os. In the home, the sovereign treatment is and will remain combined version.

J. P. GREENHILL.

Thompson, William B.:   The Treatment of Placenta Previa, Together with the Anatomical Description of Two Specimens.   Bulletin of Johns Hopkins Hospital, 1921, xxxii, 228.

There were 66 cases of placenta previa noted in a series of 10,000 cases admitted to the Johns Hopkins Hospital. Seven of the mothers were lost, a mortality of 10.6 per cent. There were 48 fetal deaths. The following types of placenta previa were noted: 14 centralis, 27 partialis, 24 marginalis, and 41 lateralis. The patients were treated as follows: 2 by Braxton Hicks' bipolar version with 1 maternal death; 2 by rupture of membranes with 1 maternal death; 2 by cesarean section with 1 maternal death; 8 admitted in the second stage and delivered by forceps, version, and extraction, etc., with 2 maternal deaths; 15 manual dilatation of the cervix with 2 maternal deaths; 36 by balloon with no maternal death. One on whom the rubber bag was used died undelivered. The author feels justified in stating that treatment by means of the balloon is eminently satisfactory and that the Braxton Hicks' bipolar version followed by slow extraction is the next best method of procedure when the balloons are not available. He thinks that

cesarean section should not be considered as a routine method and should be employed only under the strictest indications. Two specimens are illustrated. Case I, autopsy findings in a patient moribund on admission, is chiefly of interest in showing how small an area of placental detachment (2 cm.) may lead to a fatal termination, and also represents the only fatality in the series following the use of a rubber balloon. Case II portrays a central placenta previa *in situ*, an accidental finding in a uterus which was removed by supravaginal amputation on account of atresia of the cervix and intrapartum infection. C. O. MALAND.

Brodhead and Langrock: Placenta Previa, an Analysis of One Hundred Cases. Surgery, Gynecology and Obstetrics, 1921, xxxii, 55.

Of this series 17 were primiparae, 78 multiparae, 5 unknown. As to location, 58 were marginal, 25 central, 12 lateral, and 5 unknown. There were 9 maternal deaths. One of these was due to tuberculosis, one patient came to the hospital exsanguinated. Five of the fatal cases were of central type and all treated by conservative methods, i.e. manual dilatation and de Ribes bag. In the series were six cases treated by cesarean section and 8 normal deliveries. The total fetal mortality was 66; of these, 39 were either dead before delivery or not viable, leaving a mortality of 27 viable babies.

After reviewing their work, the authors incline towards conservative methods, reserving cesarean section for primiparae at or near term, with central implantation, slight dilatation, and with the infant in good condition. It is also to be considered in patients who prefer to take the additional risk in order to have a live child and in multiparae who have already lost considerable blood. R. E. WOBUS.

Brouha, M.: Concerning the Treatment of Placenta Previa by Abdominal Hysterotomy. Gynécologie et Obstétrique. 1922, v, 198.

The author reports eleven cases of placenta previa treated by cesarean section, six of them primiparae. Four were operated before labor, 7 at the beginning of labor. One was seven months pregnant, the others at or near term. In one case, complicated with a myoma, hysterectomy was done. Ten women recovered of which two had febrile convalescence. One case died four hours after operation. Two infants died within two hours. The author advises against the performance of cesarean section in a case which is potentially infected. F. L. ADAIR.

Essen-Möller: Some Remarks on the Treatment of Placenta Previa. Acta Gynecologica Scandinavica, 1921, i, 1.

During the last 20 years the author has observed 132 cases of placenta previa, most of which he treated himself. There was a general maternal mortality of 3.7 per cent and a fetal mortality of 45.6 per cent. Delivery was spontaneous in 22 cases, in which there was no maternal mortality but a fetal mortality of 36.3 per cent. These were all mild cases. Rupture of the membranes alone was practised 33 times, there being no maternal death and a fetal mortality of 28.4 per cent. Braxton-Hicks version was performed in 51 patients with 2 maternal and 37 fetal deaths 69.8 per cent). In the cases where the delivery was spontaneous after version, the fetal mortality was 73.8 per cent whereas in the cases where delivery was accomplished immediately after version, the fetal mortality was 54.5 per cent.

In seven cases abdominal cesarean section was performed. One mother and two infants died. Vaginal cesarean section was performed twelve times. No mothers were lost and only one baby died. The author's method of choice is version and incision of the anterior wall of the lower uterine segment when the child begins

to suffer. Before his first vaginal cesarean section, the fetal mortality was 58.6 per cent. Since doing the vaginal operation with immediate extraction of the child, the fetal mortality has been reduced to 20.4 per cent and this result has been accomplished without affecting the maternal mortality.   J. P. GREENHILL.

Speidel: The Treatment of Placenta Previa. Southern Medical Journal, 1921, xiv, 486.

If hemorrhage occurs before the eighth month, Speidel packs the vagina with gauze and attempts to hold the uterus against the gauze pack by strapping the abdomen from above down and backward, to make transportation to the hospital safe. As a general rule, he advocates the use of the Voorhees bag which he inserts against the ovum in cases where the child is viable, while in the earlier cases he ruptures the membranes before inserting the bag. After full dilatation, he either ruptures the membranes to bring down the presenting part, or does podalic version. Cesarean section is reserved for those cases with viable child in which there are other abnormalities, such as moderately contracted pelvis or rigid os.

If a patient is actively in labor beyond the eighth month, he prefers to rupture the membranes and give three minim doses of pituitrin every half hour until delivery is effected, rather than transport the patient to a hospital. R. E. WOBUS.

Whitehouse: Cesarean Section in the Treatment of Placenta Previa. Journal of Obstetrics and Gynaecology of the British Empire, 1922, xxviii, 469.

A detailed report is given of 317 cases of placenta previa occurring in Birmingham hospitals. Two hundred and eleven cases treated by version gave a maternal mortality of 4.2 per cent and a fetal mortality of 91 per cent. Thirty-five cases treated with a de Ribes bag gave a fetal mortality of 73 per cent and no maternal death. Five cases treated by cesarean section gave a 20 per cent maternal mortality and a fetal mortality of 40 per cent. Thirty-five mild cases delivered spontaneously and 11 cases treated by rupture of the membranes ended without a maternal death.

Cesarean section obviously is unnecessary in the average case of the marginal type. Neither is one justified in subjecting a woman to an abdominal section when it is apparent from the severity of the initial hemorrhage that there is little likelihood of a living healthy child being obtained. The author employs cesarean section for cases causing symptoms after the eighth month, when it is safe to assume that the initial hemorrhage has not impaired the vitality of the child.

H. W. SHUTTER.

Blair, Alexander C.: A Case of Placenta Previa Centralis with Spontaneous Delivery of the Child. British Medical Journal, July 2, 1921, 10.

The author states that in his 3000 confinements he has met with placenta previa once in 350, with a total placenta previa once in about 800 cases. Under favorable conditions he considers the operation of election to be cesarean section for the complete cases. The author advises tamponade of the os and vagina combined with forceps delivery or internal version depending on the position in the individual case. In the author's cases there was no maternal mortality with a fetal mortality of 50 per cent. He reports a case of a multipara viii who was seized with a sudden hemorrhage. He tamponed the os and the vagina but labor did not begin. This was repeated every day for a week and there was no hemorrhage after the second day. At the end of this time there was a sudden hemorrhage with the onset of severe labor. On reaching the case, about a quarter of an

hour later, he found that there had been a spontaneous delivery with a fair amount of hemorrhage. On examination the placenta was found in the uterus closely adherent all around the fully dilated os. This was removed manually. Examination of the placenta showed that the child had been delivered directly through a tear in the placental tissue. F. L. ADAIR.

Book Notices

Acknowledgement is made of the receipt of the following books, selected reviews of which will appear in early numbers:

NURSERY GUIDE. FOR MOTHERS AND NURSES. By LOUIS W. SAUER, M.A., M.D. Senior attending Pediatrician, Evanston Hospital; formerly attending physician Chicago Infant Welfare, and assistant attending physician Children's Memorial Hospital, Chicago. Illustrated C. V. Mosby Company, St. Louis, 1923.

LE CURETTAGE UTÉRIN. By J. FIOLLE, Professeur à l'École de Médecine de Marseille, Chirurgien des Hôpitaux. Masson et Cie, Editeurs, 1922.

LEHRBUCH DER GYNAEKOLOGIE. FUER STUDIERENDE UND AERZTE, VON DR. MED. ROBERT SCHROEDER ord. Professor fuer Geburtshilfe und Gynaekologie und Direktor der Universitaets-Frauenklinik in Kiel, mit 324 teils farbigen Abbildungen in Text und 3 farbigen Tafeln. Verlag von F. C. W. VOGEL, Leipzig, 1922.

OBSTETRICS FOR NURSES. By EVERETT DUDLEY PLASS, M.D. Obstetrician-in-chief, Henry Ford Hospital; Formerly Associate Professor of Obstetrics in Johns Hopkins Medical School. D. Appleton & Company, New York, 1922.

TRANSACTIONS OF THE EDINBURGH OBSTETRICAL SOCIETY. Session 1921-1922. Volume XLII, Oliver & Boyd, Tweeddale Court, Edinburgh, 1922.

LE RADIUM EN GYNÉCOLOGIE. By A. SIREDEY AND JEAN GAGEY, ''L'Expansion Scientifique Française'', Paris, 1922.

THE ANATOMY OF THE FEMALE PELVIS. Descriptive and Applied. By F. A. MAGUIRE Honorary Assistant Gynecologic Surgeon, Royal Prince Alfred Hospital, Sydney; lecturer and demonstrator (and acting-professor) in Anatomy, University of Sydney. Angys & Robertson Ltd., Sydney, 1922.

DER GEBURTSHILFLICHE PHANTOMKURS. By DR. MED. WILHELM LIEPMANN a.o. Professor fuer Frauenheilkunde an der Friedrich Wilhelm-Universitaet in Berlin. Urban & Schwarzenberg, Wien, 1922.

UEBER DEN ERSATZ DER OPERATION DES GEBAERMUTTERKREBSES DURCH DIE STRAHLENBEHANDLUNG. By MEDIZINALRAT DR. KARL NEUWIRTH, Wien und Leipzig, Wilhelm Braumueller, 1923.

TRATADO DE GINECOLOGIA. Por M. Hofmeier, Professor de Obstetricia Y Ginecologia de la Universidad de Wurzburgo, Con 297 Figuras en el Texto Y 10 Láminas, Casa Editorial P. Salvat, Barcelona 1922.

TRATADO DE OBSTETRICIA. Por el Dr. D. Sebastián Recasens Girol, Catedrático por oposición de Obstetricia y Ginecologia de la Medicina de Madrid; Académico de la Real de Medicina; Presidente de la Academia de Obstetricia y Ginecologia de Madrid. Cuarta edición, ilustrada con gran numero de gracados, Casa Editorial P. Salvat. Barcelona 1920.

LA STÉRILITÉ FÉMININE. Ses Causes Son Traitement Avec 23 Figures dans le Texte par Dr. Jules Batuaud. Gaston Doin, Editeur Paris, 1922.

URSACHEN UND BEHANDLUNG DER UNFRUCHTBARKEIT. Zugleich ein Beitrag zu den Störungen des Sexuellen Lebens, besonders der Dyspareunie, von Prof. Dr. E. Kehrer, Geheimer Medizinalrat, Direktor der Staatlichen Frauenklinik, Dresden. Mit 4 Tabellen, 13 Kurven und 2 Abbildungen. Verlag von Theodor Steinkopff, Dresden und Leipzig, 1922.

DIE GEBURTSHILFICH-GYNÄKOLOGISCHE UNTERSUCHUNG. Ein Leitfaden für Studierende und Praktische Ärzte von Dr. Hugo Sellheim, O. ö. Professor und Direktor der Universitäts-Frauenklinik in Halle a. S. Mit 94 Abbildungen, Vierte, Vermehrte und Umgearbeitete Auflage. Verlag von J. F. Bergman München. 1923.

LA SYPHILIS. Avec 41 Figures dans le Texte, Par Dr. Clement Simon. Médicin de l'Infirmerie Spéciale de Saint-Lazare. Ernest Flammarion, Editeur Paris 1922.

THÉRAPEUTIQUE GYNECOLOGIQUE. Indications et Technique de la Méthode de Brandt Avec 17 Figures dans le Texte, par Dr. Hélène Sosnowska. Gaston Doin, Editeur, Paris, 1922.

MANUAL DE OBSTETRICIA por el Prof. Fabre, de la Clinica Obstétrica de la Facultad de Medicina de Lyón, Miembro correspondiente de la Academia de Medicina, Tomo I, Parto Normal. Tercera Edición. Ilustrada con 238 Figures Intercaladas en el Texto. Casa Editorial P. Salvat, Barcelona, 1923.

SEX PROBLEMS IN WOMEN. By A. C. Magian, M.D. Gynaecologist to the Manchester French Hospital; Médaille de la Reconnaissance Francaise; Medaille du roi Albert. William Heinemann, London, 1922.

Items

The publishers have decided to meet the increasing demands for space on the part of contributors by enlarging each issue of the journal, beginning with this number, to 128 pages.

The Thirty-Sixth Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons will be held in Philadelphia, on September 19, 20 and 21st, 1923.

At the Annual Meeting of the American Gynecological Society held at Hot Springs, Virginia, May 21st, 22nd and 23rd, the following new officers were elected for the ensuing year:

President, Dr. Barton Cooke Hirst, 1821 Spruce Street, Philadelphia, Pa.
1st V.-P., Dr. John Osborn Polak, 20 Livingston St., Brooklyn, N. Y.
2nd V.-P., Dr. Herbert M. Little, 285 Stanley Street, Montreal, Canada.
Secretary, Dr. Arthur H. Curtis, 104 S. Michigan Ave., Chicago, Ill.
Treasurer, Dr. Charles C. Norris, 22nd & Chestnut Sts., Philadelphia, Pa.

Other Members of the Council:
Dr. Robert L. Dickinson, New York City.
Dr. Walter W. Chipman, Montreal, Canada.
Dr. George Gray Ward, New York, N. Y.
Dr. John A. Sampson, Albany, N. Y.
Dr. W. C. Danforth, Evanston, Ill.
Dr. Floyd E. Keene, Philadelphia, Pa.

Very truly yours,
ARTHUR H. CURTIS.

INDEX

O

Editorial Communications

Original Contributions.—Contributions, letters, books for review, and all other communications relating to the editorial management of the Journal should be sent to Dr. George W. Kosmak, 23 East 93d Street, New York.

All articles published in this Journal must be contributed to it exclusively. If subsequently printed elsewhere (except in a volume of Society Transactions) due credit shall be given for original publication. The editor relies on all contributors conforming strictly to this rule.

Neither the editor nor the publisher accepts responsibility for the views and statements of authors as published in their "Original Communications."

Translations.—The Journal will be pleased to receive, and to translate contributions by Continental authors if on examination they prove desirable.

Illustrations.—A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editor for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered only in India ink, or black typewriter ribbon (when the typewriter is used), as ordinary blue ink or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

Exchanges.—Contributions, letters, exchanges, reprints, and all other communications relating to the Abstract Department of the Journal should be sent to Dr. Hugo Ehrenfest, 713 Metropolitan Building, St. Louis, Mo. Writers on gynecological subjects are requested to place this address on their regular mailing list for reprints.

Reprints.—Reprints of articles published among "Original Communications," may be ordered specifically, in a separate communication to the Publishers, The C. V. Mosby Co., 508 North Grand Blvd., St. Louis, U. S. A., who will send their schedule of prices.

Review of Books.—Publishers and Authors are informed that the space of the Journal is so fully occupied by matter pertaining to the branches to which it is devoted, that only works treating of these subjects can be noticed. Books and monographs, native and foreign, on Obstetrics, Gynecology and Abdominal Surgery will be reviewed according to their merits, and space at disposal. Send books to Dr. George W. Kosmak 23 East 93rd Street, New York.

Business Communications

Business Communications.—All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 508 North Grand Blvd., St. Louis, Mo.

Subscription Rates.—Single copies, 75c. To anywhere in United States, Cuba, Porto Rico, Canal Zone, Mexico, Hawaii and Philippine Islands, $6.00 per year in advance. To Canada and under foreign postage, $6.40. Includes two volumes a year, January and July.

Remittances.—Remittances for subscriptions should be made by check, draft, postoffice or express money order, or registered letter, payable to the publishers, The C. V. Mosby Co.

Change of Address.—The publishers should be advised of change of subscriber's address about fifteen days before the date of issue, with both new and old addresses given.

Nonreceipt of Copies.—Complaints for nonreceipt of copies or requests for extra numbers must be received on or before the fifteenth of the month of publication; otherwise the supply is apt to be exhausted.

Advertisements.—The advertising policy of the Journal will conform to the standards set by the Council of Pharmacy and Chemistry of the American Medical Association. Only articles of known scientific value will be given space. Forms close first of month preceding date of issue. Advertising rates and page sizes on application.

TELEPHONE YOUR DEALER

for D. R. L.
Neoarsphenamine

This superior product is character-
ized by:

1—**PURITY**—freedom from reaction.

2—**HIGH** Chemo-Therapeutic index—
proven by clinical results.

3—**EASE** of solubility—simplicity in
preparing solutions

4—**WIDE** margin of safety due to in-
tensive research and improved
methods of production.

INSIST UPON

Safety First — Quality Always

THIS MEANS D. R. L.

Directory of New and Important Medical Books

For the benefit of our readers we have decided to run in each issue of the Journal, a list of new and reliable books of interest to Obstetricians, Gynecologists and Abdominal Surgeons. We have decided on this as an additional method of serving our readers more effectively during 1923. (See further explanation on opposite page.)

ABDOMEN

Barnard—Contributions to Abdominal Surgery $ 5.75
Battle—Lectures on Acute Abdomen.......... 1.75
Cope—Early Diagnosis of the Acute Abdomen 3.45
Deaver & Ashhurst—Surgery of Upper Ab-
    domen 11.00
De Garmo—Abdominal Hernia (Its Diagnosis
    and Treatment) 6.00
De Garmo—Mechanical Treatment of Ab-
    dominal Hernia 2.50
Rovsing & Pilcher—Abdominal Surgery 6.00

CARE OF BABY, ETC.

Abt—The Baby's Food 1.25
Ashby—Infant Mortality 6.00
Bailey—The Babe in Your Arms 1.00
Baldwin—Physical Growth of Children from
    Birth to Maturity.................... 3.75
Birk—Diseases of Infancy................. 4.00
Chapin & Pisek—Diseases of Infants and
    Children 4.50
Croy—One Thousand Things a Mother Should
    Know 1.75
Davis—Mother and Child (For the Laity).... 2.75
Dennett—Simplified Infant Feeding........... 5.00
Dennett—The Healthy Baby................. 1.25
Fischer—The Health-Care of the Baby (for
    Mothers and Nurses) 1.25
Fischer—Health-Care of the Growing Child... 1.62
Gould—Science of Feeding Babies........... 1.50
Griffith—Care of the Baby 2.50
Grulee—Infant Feeding 4.50
Hess—Infant Feeding 4.00
Hill—Infant Feeding 5.00
Holt—Care and Feeding of Children 1.25
Holt—Diseases of Infancy and Childhood..... 7.50
Holt—Foods, Health and Growth of Children 1.50
Kerley—Short Talks with Young Mothers.... 1.50
Kerr—Care and Training of Children 1.12
Kilmer—Practical Care of Baby and Young
    Child 1.00
MacCarthy—The Healthy Child from Two to
    Seven 1.50
Morse—Diseases of Children (Case Histories) 7.50
Porter & Carter—Management of the Sick In-
    fant 7.50
Ramsey—Care and Feeding of Infants and
    Children (Suggestions on Nursing) 2.50
Royster—Handbook of Infant Feeding 1.25
Sauer—Nursery Guide for Mothers and Nurses 1.75
Sheffield—Diseases of Children 9.00
Slemons—Prospective Mother 2.00
Smith & Greene—The Baby's First Two Years 1.25

GENITOURINARY, ETC.

Asch—Gonorrhea 2.00
Brodel—Anatomical Chart of Male and Female
    Genitourinary Organs 13.50

Cabot—Modern Urology (2 Vols.) $16.00
Chetwood—Practice of Urology.............. 8.00
Cullen—Diseases of the Umbilicus........... 12.00
Hazen—Textbook of Syphilis 7.50
Lumb—Gonorrhea (Systematic Treatment) .. 1.75
Luys—Textbook of Gonorrhea and its Complica-
    tions 6.50
Luys & Wolbarst—Cystoscopy and Urethros-
    copy 8.50
Marshall & French—Syphilis and Venereal Dis-
    eases. Wm. Wood & Co. 6.50
Morton—Genitourinary Diseases and Syphilis 8.50
Opie—Diseases of Pancreas 4.00
Oppenheimer—Practical Points on Gonorrhea 1.25
Pederson—Urology in Men, Women, Children 8.50
Pilcher—Practical Cystoscopy 7.00
Smith—Genitourinary Surgery 3.50
Greditzer—Manual of History Taking and Ex-
    amination on G.-U. Cases................ .50
Guiteras—Urology (2 Vols.) 15.00
Heitzman—Urinary Analysis and Diagnosis... 4.00
Keyes—Urology 8.50
Longyear—Nephrocoloptosis 3.00
Gouley—Surgery of Genitourinary Organs .. 2.00
Greene & Brooks—Diseases of Genitourinary
    Organs and Kidney 6.50
Watson—Gonorrhea and Its Complications in
    Male and Female 4.00
White & Martin—Genitourinary Surgery 8.50

GYNECOLOGY

Aarons—Aids to Gynecology 1.75
Aarons—Gynecological Therapeutics 2.00
Anspach—Gynecology 9.00
Ashton—Practice of Gynecology 9.00
Bailliere—Atlas of Anatomy and Physiology of
    Female Human Body................... 2.00
Bandler—Vaginal Celiotomy 5.50
Bell—Principles of Gynecology 10.00
Bell—The Pituitary 8.00
Bell—The Sex Complex 6.00
Berkeley, Andrews & Fairbairn—Diseases of
    Women 10.00
Berkeley & Bonney—Gynecology in General
    Practice 6.50
Burrage—Gynecological Diagnosis 7.00
Clark, Winter & Ruge—Gynecological Diag-
    nosis 7.00
Crossen—Diseases of Women 10.00
Crossen—Operative Gynecology 10.00
Cullen—Cancer of Uterus 7.50
Cullen—Uterine Adenomyoma 5.00
Deaver & McFarland—The Breast (Anomalies,
    Diseases and Treatment) 11.00
Dudley—Gynecology and Obstetrics 2.00
Dudley—Gynecology 6.50
Eden & Lockyer—A New System of Gyne-
    cology (3 Vols.) 36.00

Directory of New and Important Medical Books— *Continued*

(See preceding pages for list of books)

SEXUAL LIFE, ETC.

Bloch—Sexual Life of our Times	7.00
Davis—Impotency, Sterility and Artificial Impregnation	1.50
Doncaster—The Determination of Sex	4.00
Kempf—Psychopathology	9.50
Kisch—The Sexual Life of Women	6.00
Krafft & Ebbing—Psychopathia Sexualis	5.00
Malchow—The Sexual Life	3.00
Wall—Sex and Sex Worship	8.50

SURGERY

Ashburst—Practice and Principles of Surgery	10.00
Bartlett—After-Treatment of Surgical Patients (2 Vols.)	12.50
Binnie—Operative Surgery	12.00

Crile—Thyroid Gland........................	5.00
Crile & Lower—Surgical Shock	6.50
Da Costa—General and Operative Surgery ..	10.00
Hertzler—Clinical Surgery by Case Histories (2 Vols.)	16.00
Hertzler—Diseases and Surgery of Thyroid Gland	5.00
Hertzler—The Peritoneum (2 Vols.)	12.00
Horsley—Operative Surgery	10.00
Kelly—Appendicitis	7.00
McGrath—Operative Surgery	8.00
Rose & Carless—Manual of Surgery..........	9.50
Schmieden & Turnbull—The Course of Operative Surgery	6.50
Thomson & Miles—Manual of Surgery (4 Vols.) per vol.	3.80
Waring—Manual of Operative Surgery	4.50

Directions In Ordering

In ordering books from this directory be sure that you send check with order. This is necessary because few of these books are published by ourselves and the discount allowed by publishers to us is not large enough to warrant our opening up charge accounts. It is no reflection on the credit of any reader of the Journal, but is simply a commercial condition over which we have absolutely no control.

Write the name of author, book and amount plainly. Sign attached coupon and mail with your check. Books will be sent ALL transportation charges paid.

-------------------------------   CUT HERE   -------------------------

C. V. Mosby Company,
    508 North Grand Blvd., St. Louis, Mo.

      Please send me by prepaid express the following books for which I enclose check for $..........

....

....

....

....

Name ....

Address ....